A typology comparing male organic purchasers and male non-organic purchasers: Nutrition, health and buying behaviours

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Summary

Typologies of purchasers and consumers of organic food are based on surveys on attitudes and purchasing motives or household panel data. The subjects of these studies are predominantly women or households. For men, a segmentation based on actual food consumption has so far never been conducted. In the present study, data from the German National Nutrition Survey (NVS II) are used to cluster nutrition types based on the consumption of fruit, vegetables and meat separately for male purchasers and non-purchasers of organic food. The identified nutrition types were then characterised regarding further aspects. For both, purchasers and non-purchasers of organic food, the typology reveals a distinct relationship between healthier food consumption and a higher importance attached to sustainability and health related criteria for food purchase. Organic buyers eat more fruits and vegetables and less meat, and value the above-mentioned criteria more highly than non-purchasers of organic food.

Keywords: NVS II, gender, organic purchaser, cluster analysis, typology, nutrition behaviour

Men as organic purchasers are a large but generally neglected target group – 40 % of men in Germany who buy groceries say they buy organic products. However, little is known about the nutrition behaviour, lifestyle and attitudes of this group compared to female organic food consumers. This article fills these gaps based on data from the German National Nutrition Survey II (NVS II) by identifying, characterising and comparing the nutrition types of male purchasers and non-purchasers of organic food.

Problem

With regards to purchasers of organic food, conclusions about purchasing behaviour are frequently transferred to nutrition behaviour. Thus, both analyses of household purchase data and surveys of attitudes and purchasing motives indicate that a high organic food purchase or consumption intensity is associated with higher consumption of fruit and vegetables as well as lower consumption of meat [1–11]. In studies that identified different types of consumers [3, 5–9], it is noticeable that when organic purchasers and non-organic purchasers (or consumers) are analysed together, the organic consumers are often concentrated in just a few types. Further to the aforementioned characteristics of their nutrition behaviour, the organic consumers are frequently distinguished from the other consumer groups by their positive attitudes towards health and ethical issues such as environmental conservation or Fair Trade [3, 5–9]. These typologies are based predominantly on attitudes and purchasing motives [1, 2, 5–9] or on organic purchasing behaviour [4, 10].

So far, organic purchasers have never been typologised based on their actual food consumption. Further-

more, previous studies usually focused on women [1–3, 5–8], who are predominantly responsible for food purchasing and frequently also have a positive attitude towards sustainability issues [12]. However, according to the NVS II, almost 50 % of men in Germany are, according to their own statements, at least partially responsible for food purchasing in their households [13]. In this group, 40 % of the men state they buy organic products.

In this context, we identify nutrition types separately for male purchasers and non-purchasers of organic food based on the data from the NVS II [13, 14]. Thereby, we analyse whether – as was suggested by previous segmentation studies dominated by women [3, 5–8] – it is possible to identify nutrition types for male organic purchasers that are fundamentally different to those of non-organic purchasers, or whether these two groups show similar behavioural patterns regardless of their affinity to organic food. Furthermore, it is analysed whether organic food purchasers with particularly high organic purchasing intensity are concentrated in those types who, measured by their consumption of fruit, vegetables and meat, have a healthy diet. We also analyse whether food consumption among men is associated, as it is for women, to sustainability or health related criteria for food purchasing, health related characteristics of lifestyle, and socio-demographic characteristics.

Methodology

Database, sample, and measuring instruments

The analyses are based on data of the NVS II, a representative survey of nutrition behaviour for the German-speaking population. Between 2005 and 2007, approximately 20,000 persons aged between 14 and 80 participated in the survey. Basic information on socio-demography, on nutrition and health behaviour as well as cooking competence was collected in a personal computer-assisted interview and a written questionnaire. Anthropometric measurements were also conducted at study centers. Food consumption of the last four weeks was assessed with a Diet-History Interview using the software DISHES (**D**ietary **I**nterview **S**oftware for **H**ealth Examination **S**tudies) [13, 15].

In this analysis, 5,957 men aged between 18 and 80 years were identified as either organic purchasers or non-organic purchasers based on their own statements regarding their purchase of organic food.[1] The organic purchasers were then further segmented into the groups of intensive, moderate, or rare buyers. The segregation was based on the recorded purchase frequency of organic variants from twelve groups of food products. For this, an index was developed by participants' scoring the frequency of their organic purchases ("[almost] always" = 1, "frequently" = 2, "rarely" = 3, "never" = 4), and then dividing the sum of the scores by the number of products scored. Food products for which the answer was "I do not eat/drink that" were not considered. The resulting quotient ranges from 1 to 4, whereby the intensive buyers had values < 2, the moderate buyers had values from 2 to < 3 and the rare buyers had values from 3 to 4 [16]. This means the organic purchasers and non-organic purchasers were classified based on their purchases but not on the consumption of organic and conventional products. Information on the quantities of fruit, vegetables, meat and soft drinks consumed was gathered with the Diet-History-Interview, where no distinction was made between the consumption of organic and conventional food products.

Statistical analyses

Separate cluster analyses were carried out with the statistical software SPSS 17.0 for male organic and non-organic purchasers based on their food consumption behaviour in order to identify so-called nutrition types.[2] The quantities of fruit, vegetables and meat consumed per day served both as group-forming variables and as indicators for a health rating of food consumption. According to the recommendations from the German Nutrition Society (DGE), daily consumption should include at least 400 g vegetables and 250 g fruit, and a maximum of 300–600 g meat per week, equivalent to 43–86 g meat and sausage products per day [17].

Using a hierarchical cluster analysis (Ward method), the optimum cluster count was nearly achieved for the group of organic purchasers and for the non-organic purchasers. The final number of clusters was determined by way of cluster centre analyses (k-means) applied for different potential numbers of clusters. With post-hoc-multiple comparisons (Tamhane's T2) the discriminatory power of the cluster-forming variables was analysed for the different cluster solutions, and discriminant analysis was used to provide an additional statistical validation of the final cluster solutions.

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[1]The sample used here comes from the initial dataset, in which all evaluable cases with information on organic food purchases, namely 5,961 men and 7,113 women aged 18 or over, were contained. The initial dataset was verified for outliers by means of hierarchic cluster analysis (single linkage method) based on fruit, vegetables and meat consumption. Four outliers were removed from the sample of men, so it was reduced to 5,957 respondents.
[2]An explanation of the statistical methods and indicators listed in this section can be found for instance in: Backhaus K, Erichson B, Plinke W, Weiber R. Multivariate Analysemethoden. Eine anwendungsorientierte Einführung. 12. Aufl., Springer, Heidelberg, (2008), chapter 8, p. 389ff.

The following variables were used to specify the formed clusters: organic purchasing intensity in the group of the organic purchasers, aspects of nutrition and purchasing behaviours (soft drink consumption, self-assessment of cooking competence, importance of convenience products), BMI [Body Mass Index], smoker status, physical activity, and various socio-demographic characteristics. Additionally, two attitude-related indices were created on aspects of sustainability and health. For this, we used the question: "How important are the following aspects to you when purchasing food?", for which four answer options were possible, ranging from "unimportant" to "very important". This question covered a total of 26 aspects, and the relevant aspects were used to form each of the two indices. The purchase criteria in the index "aspects of sustainability", namely "seasonal products", "regional products", "ecological or environmentally friendly packaging", "animal welfare", "fair trade products", and "no genetically modified food products", were included after verification of the scale reliability according to Cronbach's alpha. The Cronbach's alpha-value of 0.8 is considered as good [18]. For the index of health aspects, we considered the health-related purchasing criteria "health", "few additives", and "declaration of contents and nutrients". The Cronbach's alpha is 0.7, which is acceptable [18].

Differences between two groups were analysed by comparisons of means (t-test), or in the case of frequencies using Pearson's Chi-squared test. When more than two groups were compared, we applied post-hoc multiple comparisons (Tamhane's T2).

Results

The two-step method of cluster analysis outlined above produced six nutrition types for the 2,297 organic purchasers and six for the 3,660 non-organic purchasers, with a correct classification rate of 97.7 % (organic purchasers) and 96.3 % (non-organic purchasers) according to the discriminant analysis. It is notable that both purchaser groups show structurally comparable clusters regarding group size, quantities of the different food products consumed, plus other characteristics (for instance, criteria for purchasing food, proportion of smokers, and age). The similar types for each group are listed in the same column in ◆ Table 1. Differences between the structurally similar types of organic purchasers and non-organic purchasers are found predominantly in the consumption of food: Organic purchasers in all clusters show a lower meat consumption and soft drink consumption, a higher vegetable consumption, and with the exception of Cluster 2 and 3, also a higher fruit consumption. Furthermore, organic purchasers frequently rate their cooking competence as better (with the exception of Clusters 2 and 5), consider sustainability and health aspects more important in food purchasing, have a lower percentage of smokers (with the exception of Clusters 1 and 3) and a higher percentage of physically active individuals (with the exception of Cluster 3) than the analogous types from the sample of the non-organic purchasers. The proportion of persons with college or university degree is considerably higher among organic than non-organic purchasers (p ≤ 0.05 for all clusters). In the clusters with a high proportion of persons with college or university degree, there is also generally a higher proportion of persons from higher income groups (not illustrated). With regards to the household size, however, there are significant differences between organic and non-organic purchasers only in Clusters 4 and 6 (p ≤ 0.05 in both cases).

Types 1, 2 and 3 of both purchaser groups are the smallest groups, with particularly high consumption of vegetables, fruit or meat. The remaining three clusters together make up more than 75 % of the sample, and with the exception of the vegetable consumption of Type 4, their consumption quantities of all food product groups range from average to below average (◆ Table 1).

In summary, the nutrition types can be characterised and compared as follows. For clarity, only the most important characteristics of each cluster are described.

Type 1, the "health and sustainability aware vegetable eater", is characterised in both purchaser groups with by far the highest consumption of vegetables, and the second highest consumption of fruit. Sustainability and health related aspects are very important for food purchases. Convenience products are of little importance. Men in the organic purchaser group say they have a relatively high cooking competence, many have college or university degrees, and a high proportion of them are intensive organic buyers. Notable among the non-organic purchasers from type 1 is the high BMI.

Type 2, the "health and sustainability aware fruit eater", has the highest average age in both purchaser groups, and consumes the highest quantities of fruit. As in type 1, the strong orientation towards sustainability and health related criteria in food purchasing is obvious. Furthermore, type 2 is characterised by the lowest proportion of smokers, and a high proportion of college or university graduates. In the group of organic purchasers of this type are mostly moderate buyers. As in type 1, for non-organic purchasers of type 2 the BMI is higher than in the other groups, and convenience products are of little relevance.

Type 3, the "young meat and soft drink consumer", is the group with the lowest average age and the high-

Male organic purchasers (n = 2 297)	Type 1 (5,0 %)	Type 2 (13,4 %)	Type 3 (5,9 %)	Type 4 (20,6 %)	Type 5 (23,3 %)	Type 6 (31,7 %)	Total (100 %)
Cluster-forming variables: arithmetic mean values							
fruit[1] (g/capita and day)***	451	**696**	210	241	*164*	*181*	274
vegetables[2] (g/capita and day)***	**691**	*259*	302	383	*167*	*168*	258
meat[2] (g/capita and day)***	95	100	**332**	119	176	*74*	127
Cluster-specifying variables: arithmetic mean values or percentages							
soft drinks (g/capita and day)***	*46*	*49*	**255**	*52*	**141**	*73*	91
intensive buyers (%)***	18,3	8,8	14,8	11,0	6,0	9,2	9,5
moderate buyers (%)***	60,0	63,0	57,8	61,8	55,0	56,1	58,2
rare buyers (%)***	21,7	28,2	27,4	27,2	39,0	34,7	32,2
sustainability aspects[3]***	**3,13**	**3,04**	*2,77*	**3,02**	*2,80*	2,96	2,94
health aspects[3]***	**3,33**	**3,29**	*2,79*	**3,19**	*2,82*	3,08	3,06
convenience products[4]**	*1,75*	1,91	1,96	1,88	**2,02**	1,98	1,95
cooking competence[5]***	**4,28**	*3,47*	**4,02**	3,75	3,68	3,67	3,71
BMI (kg/m^{2})ns	27,2	27,2	27,0	26,8	26,5	26,6	26,7
smoker[6] (%)***	16,7	8,4	32,1	16,1	20,8	16,4	17,2
physically active[7] (%)ns	73,2	62,4	59,0	67,9	65,0	62,5	64,5
age (years)***	51,0	**56,5**	*41,3*	51,0	45,7	52,0	50,3
number of persons in the household***	2,6	*2,4*	**2,9**	**2,7**	**2,8**	2,5	2,6
college or university degree (%)***	43,0	38,6	19,8	39,7	32,6	37,4	36,2

Male non-organic purchasers (n = 3 660)	Type 1 (6,6 %)	Type 2 (10,2 %)	Type 3 (4,9 %)	Type 4 (25,8 %)	Type 5 (21,7 %)	Type 6 (30,8 %)	Total (100 %)
Cluster-forming variables: arithmetic mean values							
fruit[1] (g/capita and day)***	341	**675**	191	218	*133*	148	231
vegetables[2] (g/capita and day)***	**562**	240	249	291	146	*112*	215
meat[2] (g/capita and day)***	175	128	**442**	127	234	*104*	162
Cluster-specifying variables: arithmetic mean values or percentages							
soft drinks (g/capita and day)***	*179*	*99*	**586**	*108*	340	184	209
sustainability aspects[3]***	**2,61**	**2,62**	*2,22*	**2,63**	*2,35*	2,43	2,48
health aspects[3]***	**2,96**	**3,01**	*2,32*	2,88	*2,41*	2,64	2,70
convenience products[4]***	*1,91*	*2,00*	**2,24**	2,04	**2,25**	2,13	2,11
cooking competence[5]**	3,70	3,51	3,69	3,39	3,56	3,39	3,47
BMI (kg/m^{2})***	**28,2**	**28,2**	*26,5*	27,7	*26,5*	*27,0*	27,2
smoker[6] (%)***	20,9	16,9	40,9	20,4	33,8	28,0	26,3
physically active[7] (%)**	52,3	54,3	50,8	55,9	50,9	46,9	51,4
age (Years)***	51,0	**56,2**	*38,2*	53,3	40,7	49,6	48,8
number of persons in the household***	**2,7**	*2,4*	**3,1**	2,6	**2,8**	2,5	2,6
college or university degree (%)***	19,0	23,2	6,5	23,6	14,3	18,4	18,8

[1]Fruit and fruit products (excluding juices)

[2]Vegetables/vegetable dishes (excluding potatoes) or meat/meat dishes

[3]Indices calculated based on aspects of the question: "How important are the following aspects to you when purchasing food?" 4-point scales: 1 = "unimportant" to 4 = "very important". The higher the value in the table, the more important the mentioned aspect is.

[4]Same question and scales as in Item 3. Importance of the item "convenience products"

[5]Question: „How good are your cooking skills?", scales from 1 = "I don't cook/not applicable" through 2 = "not at all" to 6 = "excellent"

[6]Question: "Are you a … smoker/occasional smoker/former smoker/or non-smoker?". The percentages refer to the answer „Smoker".

[7]Question "Are you physically active?", Yes/No

*** $p \leq 0.001$, ** $p \leq 0.01$, *$p \leq 0.05$, ns$p > 0.05$ (not significant), calculated by comparison of mean values or through Pearson's Chi-squared tests on percentages.

Bold print: highest positive significance/importance

Italic print: lowest significance/importance

Where several mean values are labelled identically, there are no significant differences between them according to post-hoc multiple comparisons (Tamhane-T2).

Table 1: **Nutrition types of male organic purchasers and non-organic purchasers**

(continued from p. 38)

est consumption of meat and soft drinks. Aspects of sustainability and health as potential purchasing criteria are of low relevance for both of these purchaser groups. This type is furthermore characterised by a high proportion of smokers and the lowest proportion of persons with college or university degree. There is a relatively high proportion of intensive buyers in the group of type 3 organic purchasers. As in type 1, these consumers also frequently say they have excellent or good cooking competence. However, the non-organic purchasers of type 3 additionally find convenience products relatively important.

Type 4, the "health- and sustainability-aware mixed dieter", has the second highest vegetable consumption in both purchaser groups. Aspects of sustainability and health as potential purchasing criteria are important, similarly to types 1 and 2. The proportion of persons with college or university degree is also similarly high to types 1 or 2. In the group of non-organic purchasers, type 4 has the highest proportion of physically active persons. Convenience products are of rather little importance in this purchaser group, just as in types 1 and 2.

Type 5, the "convenience-affine mixed dieter", has the lowest fruit consumption and a low vegetable consumption and can be characterised by the second highest meat consumption (after type 3) as well as high soft drink consumption. Further to the similarities to type 3 in meat and soft drink consumption, type 5 in both purchaser groups also has a high proportion of smokers and a low average age. Aspects of health and sustainability as potential criteria for food purchasing are less relevant and convenience products are more relevant than for the other types. In contrast to type 3, a higher proportion of type 5 organic pur-

chasers are rare buyers, and a lower proportion are intensive buyers.

Type 6, the "inconspicuous little eater", consumes only small quantities of meat and vegetables. Within the group of organic purchasers, type 6 also shows the lowest fruit consumption together with type 5. No particularities were found in other characteristics such as the relevance of aspects of sustainability and health, convenience products and education. However, the low proportion of physically active persons is notable in the group of non-organic purchasers of this type.

Discussion

Using data from NVS II, here we identify nutrition types for the first time for male organic purchasers and non-organic purchasers based on their actual food consumption. These types were linked to a number of other characteristics, and compared. This results in a far more differentiated picture than has been provided by previous studies on the motivation and attitude of organic purchasers. Both for organic purchasers and for non-organic purchasers, obvious interactions were shown between a healthier food selection (measured by the consumption of fruit, vegetable, meat and soft drinks) and the higher relevance of aspects of sustainability and health for food purchasing.

The identified nutrition types of organic purchasers and non-organic purchasers are relatively similar in their group size, so that each of the six nutrition types identified among organic purchasers has its equivalent in the group of non-organic purchasers. For instance, both purchaser groups each have the nutrition type "young meat and soft drink consumer", who is distinguished from the other types by his very high meat and soft drink consumption.

Separate cluster analyses for each purchaser group demonstrated that organic purchasers and non-organic purchasers form basically similar nutrition types. Previous studies, however, analysed organic and non-organic consumers together, with the result that the organic consumers were predominantly concentrated together in clusters [3, 5–9]. Differences between organic consumers and non-organic consumers were therefore more visible than in the methodological approach chosen for this study, which also emphasizes the common features of these two groups.

Despite the many similarities, clear differences were also found between the comparable types of organic purchasers and non-organic purchasers. With regards to their nutrition behaviour, the type from the organic purchaser group always shows a healthier selection of food, and pays more attention to sustainability and health related criteria for food purchasing. With the exception of the consumption of fruit in types 2 and 3, this was found for all groups. There are also strong differences in their health behaviour. The clusters from the group of organic purchasers mostly have a lower proportion of smokers, and a higher proportion of physically active persons. The intensive, moderate and rare buyers of organic products cannot be reliably linked to any particular nutrition type. The "health- and sustainability-aware vegetable eaters" have an above-average proportion of intensive buyers (18 %), but the "young meat and soft drink consumers" with relatively low sustainability awareness also have a visibly higher proportion of intensive buyers (15 %) than the overall average for organic purchasers. The moderate buyers are quite evenly represented in all types of organic purchasers (55–63 %). The rare buyers, on the other hand, are represented

with a remarkably high proportion in the group of "convenience-affine mixed dieters" and the group of "inconspicuous little eaters", who both consume low quantities of fruit and vegetables. All in all, these observations correspond to the results of previous studies, whereby with growing organic purchasing intensity the consumption of fruit and vegetables rises while the meat consumption drops [4, 10, 11]. Extending beyond the results of previous studies, this approach also showed that men are very heterogeneous concerning their food consumption, and the links to organic purchasing are complex. In this regard, it should be noted that intensive organic buyers are found also in the group of "young meat and soft drink consumers".

Further to the link between food selection and the organic purchasing behaviour, this analysis also indicates a relationship between food selection and the relevance of sustainability and health-related purchasing motives. Nutrition types who consume a lot of fruit and vegetables and little meat and soft drinks (types 1, 2 and 4, in total approximately 40 % of the sample), at the same time consider sustainability and health related aspects highly relevant for food purchasing. This is the case both for organic purchasers and for non-organic purchasers, even if the latter consume less fruit and vegetables and more meat and soft drinks, and even if the aforementioned purchasing criteria are less relevant for them. Accordingly, sustainability and health-related aspects are less relevant for food purchasing for the "young meat and soft drink consumers" and the "inconspicuous little eaters". The link described in the literature between the purchase of organic food and a healthier selection of food products and sustainability and health related attitudes [1–3, 5–9], which so far had been analysed

mostly for women [for instance 7, 8], was thus also confirmed for men.

Nevertheless, with regards to gender-specific consumption habits, we have to note that men in general are very different from women in their food selection. The much higher meat consumption of men is particularly striking, both for organic and for non-organic purchasers [19].

Another finding is the link between food consumption and lifestyle characteristics: while the "young meat and soft drink consumers" and "convenience-affine mixed dieters" in both purchaser groups have high proportions of smokers, the three health and sustainability aware nutrition types (1, 2 and 4) have higher proportions of non-smokers (especially type 2) and in the group of non-organic purchasers also more physically active persons. For BMI there are no or only small differences between the different nutrition types within the groups of organic or non-organic purchasers. A comparison on the level of organic and non-organic purchasers however confirms that the organic purchasers show more health-aware behaviour in the analysed lifestyle characteristics smoking and physical activity, and that they have lower BMIs. The few studies made on this issue to date also showed a link between individual lifestyle characteristics and organic food consumption. STIESS and HAYN, for example, suggest a relationship between the purchase of organic food, selection of healthier food products, and lower BMI [9]. Partly, organic affine consumer segments are also characterised as being interested in physical activities [5, 7].

A further relationship was found between food consumption and education. The three health and sustainability aware nutrition types 1, 2 and 4 in both purchaser groups have a higher proportion of college or uni-

versity graduates compared to the less sustainability oriented "young meat and soft drink consumers". Other studies also found an interaction between high organic and sustainability affinity and higher education levels [7–9].

When interpreting the data, it should be considered that the classification of organic purchasers and non-organic purchasers was made based on the interviewees' own statements on their purchase of organic food products. The objective of this work was to analyse food consumption, among other aspects, for male organic purchasers and non-organic purchasers, independent of organic or conventional production. It was not possible to verify whether the proportion of organic purchasers was over-estimated due to respondents claiming to buy organic food more often than they actually do, as was proven for instance by NIESSEN and HAMM [20].

Overall, this comprehensive typology provides farther-reaching findings on the behaviour of male organic purchasers and non-organic purchasers. These findings can be used in organic marketing and in dietary consulting to better tailor information to specific target-groups.

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Ernährungskommunikation

16. aid-Forum

Verflixtes Schlaraffenland

Wie Essen und Psyche sich beeinflussen

Programm, Anmeldung und weitere Informationen unter: www.aid.de

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14. Mai 2013

9.00 bis ca. 17.30 Uhr
Wissenschaftszentrum Bonn