ARMG Publishing "Thinking ahead" sciendo
Health Economics and Management Review, Issue 1, 2023
ISSN 2786-4634 (print) ISSN 2786-4626 (online)

DIETARY CHOICES AS PREVENTION MEASURE: ASSESSMENT OF SOCIETAL EFFECTS RELATED TO LIFE EXPECTANCY IN GERMANY

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Type of manuscript: research paper

Abstract: *Public health determines economic stability and growth. Inappropriate dietary behaviour induces a huge health burden across all age groups and geographical regions every year. Nutrition is one major driver to overcome non-communicable diseases and related costs. According to the World Health Organization, there is a gap in research considering the cost-effectiveness of policy nutrition interventions. The present modelling study is the first attempt to evaluate a potential nationwide shift towards healthy nutrition from a societal perspective. The scenario modelling builds on most recent findings from the research field and status quo food consumption according to national nutrition survey data. Potential age- and gender-specific gains in life expectancy due to diet improvement are evaluated for the 2019 population in Germany addressing different scenarios (optimal diet and feasible diet). Drawing on a human capital approach, the resulting health gains are translated into a societal value building on related gains in unpaid work productivity. The monetary evaluation of productivity increase is implemented according to the specialist's approach. The potential gain in unpaid work activities related to improved nutrition, is estimated at € 5,046bn for the 2019 German population assuming an optimal diet scenario. In case of the more feasible diet scenario, additional life expectancy is lower but still valuable. Health gains are less for women as compared to men, but the societal value is higher for females due to higher societal contribution in terms of unpaid activities across all age groups. The potential health gains are highest for young age groups, but the monetary societal value for these individuals is lower due to discounting of future benefits. The study illustrates the societal value of nutrition as one dimension of preventing non-communicable diseases. Thereby, it provides valuable insights for policy decision makers to develop interventions on the population level that support transformation of the health care systems and economic structures towards a sustainable direction.*
Keywords: diet-behaviour, nutrition; population health; prevention; life expectancy; societal impact; unpaid work productivity; indirect costs; sustainable healthcare system.

JEL Classification: A13, I12, I18

Received: 3 February 2023 **Accepted:** 10 March 2023 **Published:** 31 March 2023

Funding: There is no funding for this research.
Publisher: Academic Research and Publishing UG

Cite as: Schmitt, M. (2023). Dietary Choices as Prevention Measure: Assessment of Societal Effects Related to Life Expectancy in Germany. *Health Economics and Management Review*, 1, 26-38. https://doi.org/10.21272/hem.2023.1-03

ISSN 2786-4634 (print) ISSN 2786-4626 (online)

Introduction

According to the World Health Organization (WHO), public health is a driver of economic stability and growth (WHO, 2020). Research addressing the societal relevance of health and determining factors is fundamental for future policy decisions - reframing health care systems and economic structures towards sustainable solutions. One important influencing factor of public health is nutrition. Previous evidence highlights the link between suboptimal diet and non-communicable diseases (Fadnes et al., 2022; Rauber et al., 2018; Melaku et al., 2019; Ezzati and Riboli, 2013; Kazemi et al., 2022). Following current systematic analysis of the global burden of disease study (GBoD), worldwide 11 million death cases and 255 million disability adjusted life years (DALYs) are related to dietary risks every year (Afshin et al., 2019). German studies show that diseases related to the metabolic syndrome, as cardiovascular diseases (CVD), type 2 diabetes mellitus or colorectal cancer are highly affected by daily nutrition (DGE, 2020; Truthmann et al., 2012; Heidemann et al., 2011; Breuninger et al., 2018; Schönbach et al., 2019). In particular, disease risk increases with a high intake of red and processed meat as well as highly processed food in general (DGE, 2020; Schönbach et al., 2019; Micha et al., 2012; Nilson et al., 2023; Rohrmann et al., 2013; Fadnes et al., 2022).

In contrary, recent medical research proves that the consumption of plant based whole foods has a health protecting effect (Satija and Hu, 2018; Hemler and Hu, 2019; Kim et al., 2019; Fadnes et al., 2022). For instance, the consumption of fruits, vegetables, legumes and nuts and seeds improves health and reduces morbidity and mortality (Angeles et al., 2021; Aune et al., 2017; Schwingshackl et al., 2017; Serafini and Peluso, 2017; Harland and Garton, 2016; Le and Sabaté, 2014). As outlined by the European Commission, there is a lack of evidence considering the assessment of such functional, health protecting, foods as interventions in the context of public health. Respective research addressing the cost-effectiveness of these foods is required (Stein and Rodriguez-Cerezo et al., 2008).

The present paper aims to address this gap from a societal perspective. It analyses the potential health and societal effects of a hypothetical population wide improvement in dietary behaviour in Germany. Concretely, i) it illustrates potential age- and gender-specific health effects based on recent findings from the literature which are then extrapolated to the population level and ii) it evaluates these health effects in monetary terms from a socioeconomic point of view. Thereby, the objective of this research is not to provide point estimates of the monetary value of healthy nutrition, but to illustrate an anchor value of potential societal gains supporting decision makers when it comes to the role of nutrition as a relevant tool in protecting public health.

To determine population health, the recent study draws on life expectancy (LE) as related outcome. In the research field, LE is an established indicator to describe the overall health status of the society (OECD, 2021). Furthermore, it is closely related to growth and development economics. The Human Development Index (HDI)[i] is an approved summary measure of average achievement in key dimensions of human development that interlinks economic growth and public health in terms of LE. Commonly, the index is used as an indicator for discussing issues of national policy. However, one might argue that the fiscal burden of increasing LE, i.e., related increasing pension payments or care costs, might outweigh a positive societal value of additional life years (LY). By contrast, there are arguments that weaken this concern. First, the addressed improvement in nutrition can be assumed to reduce diseases of civilization. Consequently, costs for chronic disease treatment can be expected to decrease accordingly, although people are getting older. Second, longevity is closely related to health expectancy. Robine et al. show a clear trend that the higher the LE the higher the healthy LE is within a country (Robine et al., 2009). Third, individuals receiving the additional pension funds will use the money for additional consumption and thus create induced economic effects. Another potential concern relates to quality of life (QoL) which is not addressed when population health is measured in terms of LE. According to previous evidence, QoL and mental health improves with a healthy dietary behaviour as well (Milte et al., 2015; Wayne et al., 2006; Xu et al., 2018; Hargreaves et al., 2021). However, a more precise estimation in health gains could be realized based on individual health status information. If this is not feasible due to data restrictions as in the present case, LE provides an aggregated health measure summarizing the wide range of potential health situations and allows comparability across time and geographical region.

To quantify the impact of food consumption on LE, a scenario analysis based on recent evidence provided by Fadnes and colleagues is performed (Fadnes et al., 2022). They present an innovative approach interlinking different daily food choices on age and gender specific LE. Their main findings show that a dietary change can induce a gain in LE at any age. To monetize these gains, losses in unpaid work productivity related to premature death are considered and evaluated using related average wage rates.

The paper is organized as follows: Section 2 overviews considered data sources and applied methods. This encloses the descriptions of healthy dietary behaviour as well as status quo nutrition in Germany and a

description of diet-induced health evaluation and related societal effects. Results and discussion are provided in section 3 and 4. Section 5 concludes.

Data and Methods

Dietary behaviour – intervention and baseline scenario. Even though, there are recent approaches to build general guidelines for dietary choices that are optimized with respect to overall health and sustainability, it is hard to draw conclusions on concrete recommendations. Fadnes and colleagues identified a portfolio of most recent meta-analyses that provide dosed-response data on food intake and mortality (Fadnes et al., 2022). Based on their results and data from the Global Burden of Disease study, they define an optimal diet scenario (OD) of daily consumption of relevant food groups. Most of the underlying studies control for age, gender, intake of other food, smoking, body mass index and physical activity (Fadnes et al., 2022). Even though the optimal case would be to measure the impact of food choices on mortality risk for each food group based on the same population and given equal initial study circumstances, the considered evidence provides results as accurately as possible and appropriate for the present research objective – aiming to provide a benchmark of the health-induced societal value of food choices on the population level.

The OD defined by Fadnes et al. is set equal to the intake for which further increase/decrease of the respective food group consumption does not induce additional gains in LE. In addition, they define a feasible diet scenario (FD) that is set to the midpoint between a typical Western diet (WD)[ii] and the optimal diet (OD). With the FD, Fadnes and colleagues establish a compromise, which has higher potential for acceptance in the population but still provides significant health improvements (Fadnes et al., 2022). In the present study, the OD and the FD are considered as intervention scenarios. Table 1 provides an overview of intakes in g/day for all three scenarios.

Table 1. Daily food intake in g/day intervention scenarios (OD and FD) and baseline scenario (WD)

Food intake scenario	WD	FD Intervention 1	OD Intervention2
Whole grains (fresh weight)	50	137,5	225
Vegetables	250	325	400
Fruits	200	300	400
Nuts	0	12,5	25
Legumes	0	100	200
Fish	50	125	200
Eggs	50	37,5	25
Milk,dairy	300	250	200
Refind grains	150	100	50
Red meat	100	50	0
Processed meat	50	25	0
Sugar sweetened baverages (SSB)	500	250	0

Sources: developed by the author on the basis of (Fadnes et al., 2022)

Table note: Assumed total daily energy intake amounts to 1932 kcal. Intake of white meat and plant oils is not included in the overview, as there is no significant impact on mortality risk captured by the meta-analysis in (Fadnes et al., 2022)

The daily consumption of whole plant-based food and fish are related to a positive impact on LE, whereas animal products and processed food intake are associated with negative health effects. These tendencies are validated by a huge body of literature (Schwingshackl et al., 2017, Schönbach et al., 2019; Yip et al., 2019; Meier et al., 2019; Wallace et al., 2020; Kaluza et al., 2012; Yang et al., 2016; Wang et al., 2016; Larrick and Mendelsohn, 2018; Martínez-González and Martín-Calvo, 2019).

The base case of the present implementation, i.e., status quo nutrition in Germany, includes current dietary choices in the considered food groups. To quantify these, data from the German National Nutrition Survey II (NVSII)[iii] is considered. This representative survey was carried out by Max-Rubener-Institute between 2005 and 2007. Until now, it is the biggest epidemiological investigation assessing dietary habits in Germany. The underlying data is based on validated diet history interviews conducted with 20,000 Germans in the age of 14 to 80 years. Related results are provided by age-group and gender (MRI, 2008).

Applying this data goes along with the assumption that there was no major shift in average nutrition since the time of data collection. Validation is provided by the study of Gose and colleagues, who show that food

consumption as well as nutrient intake was relatively stable between 2005 and 2012 (Gose et al., 2016).

The considered food categories included in the NVS II differ to some extend to those defined in the study of Fadnes and co-authors (Fadnes et al., 2022). A detailed description on how the data is matched and validation by comparing the data to alternative sources is provided in the Appendix 1 (Schmitt, 2023). Table 2 shows an overview of resulting daily food choices by age and gender in Germany, which is considered as the base case scenario.

Table 2. Daily food intakes in g/day in Germany (base case scenario). Values based on NVS II results (MRI, 2008) that are matched to considered categories

Age group	14-18		19-24		25-34		35-50		51-64		65-80	
	m	f	m	f	m	f	m	f	m	f	m	f
Whole grains	100	75	87,5	75	87,5	75	87,5	62,5	75	62,5	75	62,5
Vegetables	175	175	200	162,5	187,5	187,5	212,5	212,5	212,5	212,5	225	212,5
Fruits	175	225	162,5	212,5	187,5	250	212,5	262,5	275	325	287,5	300
Nuts	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
Legumes	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
Fish	12,5	12,5	12,5	12,5	12,5	12,5	25	12,5	25	25	25	25
Eggs	12,5	12,5	25	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
Milk,dairy	325	237,5	287,5	237,5	275	225	237,5	212,5	212,5	225	200	212,5
Refind grains	262,5	200	250	187,5	250	200	250	187,5	212,5	162,5	187,5	150
Red meat	25	12,5	25	12,5	25	12,5	25	12,5	37,5	12,5	12,5	12,5
Processed meat	137,5	62,5	162,5	62,5	125	62,5	112,5	62,5	87,5	50	75	50
SSB	525	275	475	200	387,5	125	212,5	100	112,5	37,5	37,5	25

SSB = sugar sweetened beverage

Sources: developed by the author on the basis of (Fadnes et al., 2022)

Health impact. The calculation of potential gains in LE induced by daily food choices is based on the public available simulation tool developed by Fadnes and colleagues (Fadnes et al., 2022). The algorithm draws on the life table methodology developed in (Johansson et al., 2020), data from recent meta-analysis[iv] on diet-related mortality as well as data from the GBoD study. Hence, the diet-related health impact is evaluated in a life-time approach. Thereby, short-term effects in daily food choices as minor fluctuations and in particular an adjustment period when it comes to a change in nutrition behaviour are somewhat outweighed. They show health benefits due to improved nutrition for both genders at any age, but effects are largest for young males.

The public application allows the user to extract estimated values of average LE by age and gender related to any daily food choice and particularly for the above-described nutrition scenarios: WD, FD, and OD. The respective results are attributable to different geographic regions. As there are no values available specifically for Germany, provided health gains based on European data are considered as a proxy. This assumes that a change in nutrition for the addressed food groups has the same impact on LE in Germany as estimated on average for the EU by Fadnes and colleagues.

The individual effects by age and gender are extrapolated to the German population, drawing on respective population data in Germany from official statistics in 2019 (Destatis, 2022a). Hence, the calculated effects in the present paper show hypothetical effects a nation-wide shift in dietary behaviour for the 2019 population in Germany would have generated.

Socioeconomic evaluation. In this scenario analysis, the potential gain in LE due to healthier nutrition is evaluated from a societal perspective. Therefore, avoided losses in unpaid work activities related to prolonged LE are considered. These activities encompass only activities which could be replaceable by another third person such as gardening or child care (Hofmann, 2015). An overview of considered activities is provided in Appendix 2 (Schmitt, 2023). The potential of avoided losses in productive time, is measured referring to the human capital approach (HCA) (Kattan and Cowen, 2009). This defines health as an asset until the end of the life span and thus, the gain in LE induces an increase in productive time at older ages. The full picture would further consider productive time in paid work activities. Even though, there is evidence that paid employment is unequal to zero for the addressed age groups in Germany[v], these activities are excluded from the present analysis due to very small labour force participation.

Daily time spent on unpaid activities is provided by the German Federal office of statistics (Destatis, 2017). The reported daily hours refer to the average of weekdays and weekends. In consequence, yearly hours are

calculated by extrapolating the daily value to 365 days. The resulting age- and gender-specific time spent on unpaid activities is provided in Table 3.

Table 3. Applied time spent on unpaid work activities by age and gender

	Male			Female		
	70-74	75-79	80+	70-74	75-79	80+
Hours per day	3,48	3,50	2,53	4,58	4,42	3,47
Hours per year	1271,42	1277,50	924,67	1672,92	1612,08	1265,33

Sources: developed by the author on the basis of (Destatis, 2017)

The resulting potential in time spent on unpaid work activities is evaluated according to the specialist approach (United Nations, 2017). In that sense, every unpaid activity is matched to its closest market substitute and the number of hours gained is evaluated with the related average wage rate in 2019 (Destatis, 2022b). Considering the afore described activities and respective matched industries, the average wage amounts to €27.46 (Appendix 2: Schmitt, 2023).

One could argue that a specialist hired from the labour market might be much more productive due to work experience and therefore the applied specialist approach could overestimate the monetary value of loss in productive time. To address this issue, alternative evaluation scenarios based on a generalist's wage as well as on the minimum wage rate are provided in the Appendix 3 (Schmitt, 2023). Results can be taken as a lower bound. However, this criticism holds true at least for some of the considered activities. While cleaning might be managed in a shorter time by a professional worker, there occur no time savings for activities such as childcare.

As recommended by official guidelines for heath economic evaluations in Germany, all future gains are discounted at 3% to demonstrate the net present value of the results (IQWiG, 2015). As a sensitivity analysis, additional scenarios with discount rates of 0% and 5% are provided in the Appendix 4 (Schmitt, 2023).

Results

Potential health gains. As reported in Figure 1, the remaining LE shows the natural decrease with age. In line with German official statistics, LE for women is remarkably higher than for men (Schwarz and Schwahn, 2016). By construct, highest LE can be achieved with OD scenario followed by the FD scenario for both, males and females. Regarding the different base line scenarios, no significant discrepancy is observed between NVS II (German data) and WD (US and EU data).

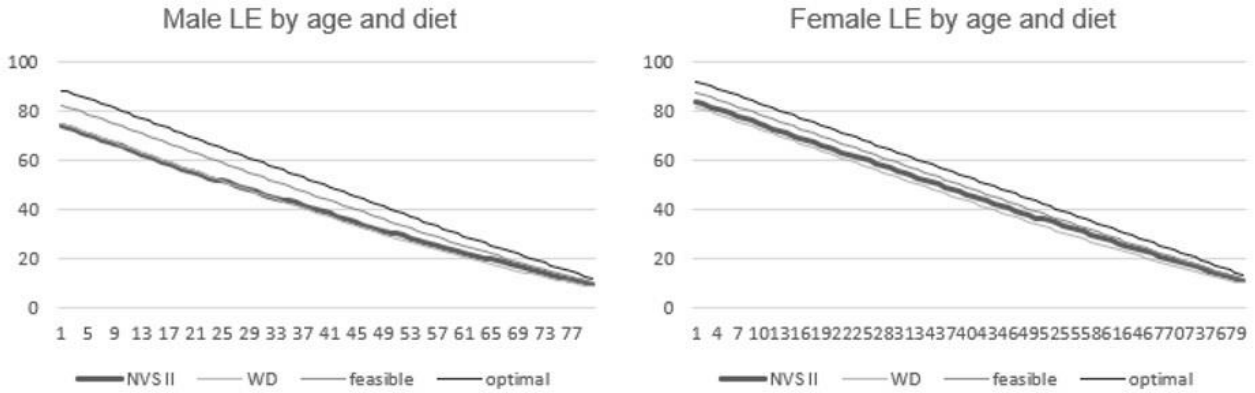

Figure 1. LE by age and gender and diet scneraio. NVS II = Base case nutrition in Germany, WD = Typical Western Diet

Sources: calculations based on (Fadnes et al., 2022)

Considering the potential gain in LE it is shown that the impact of diet improvement is larger for men than for women and that the effect decreases with age (Figure 2). Even though, the effect is highest for males who start an OD at early ages, there is still a gain in LE for men and women in all age groups at least with a switch to the FD.

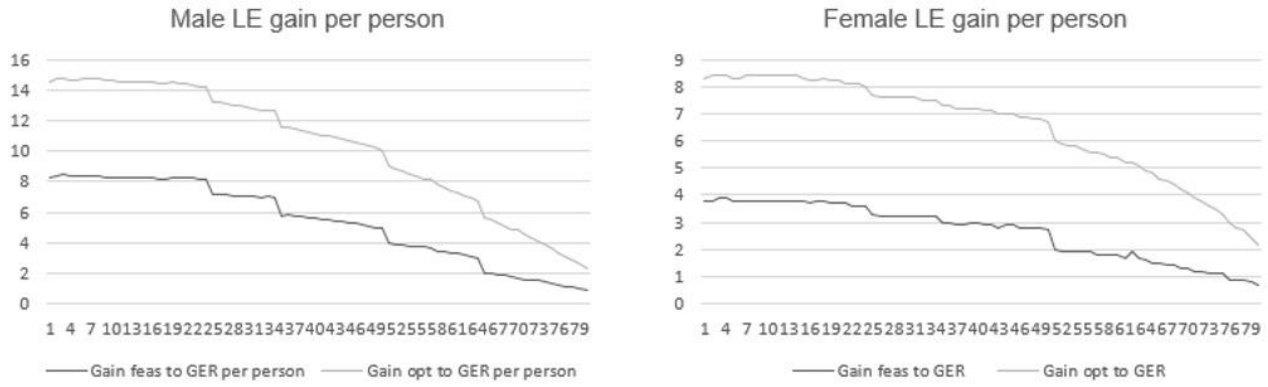

Figure 2. Potential gain in LE by age and gender for FD and OD as compared to German base case nutrition

Sources: calculations based on (Fadnes et al., 2022)

Extrapolating the results to the 2019 German population, the absolute gain in life years (LYs) amounts to almost 402M years for males and around 248M years for females in case of the OD (Table 4). For the FD the potential LY gain amounts to over 207M for men and 99M for women. The extrapolated results again underline the gender-dependent discrepancy in the results.

Table 4. Population level gain in LE for the 2019 German population. First column shows results for switch to FD, second column shows results for switch to OD

	NVS II to FD	NVS II to OD
Male	207,696,591	402,674,510
Female	99,178,225	248,116,564

Sources: developed by the author

Societal impact. The above-described results in terms of gained LY are translated into a societal value building on the potential of avoided loss in productive time. As illustrated in Figure 3 and Table 5, the average individual value of increased unpaid work activity is determined by age, gender, and diet scenario (FD/OD). Respective results varied in a range between €13,815 and €87,230 per person. To set this into the relation of the German economy, Gross domestic product (GDP) per capita was about €41,800 in 2019 (Statistisches Bundesamt VGR, 2022). Although, the health impact is higher for individuals improving their diet at early ages, the societal value is lower due to discounting of the effects occurring at the end of the lifetime. For the oldest age groups the value decreases as compared to the middle age groups. This is because diet-related health gains decrease with ageing. Results by gender show that the societal value of gained LY's is higher for females, even though the health impact is smaller. This relates to the fact that women have a higher societal contribution in terms of unpaid work activities in all considered age groups.

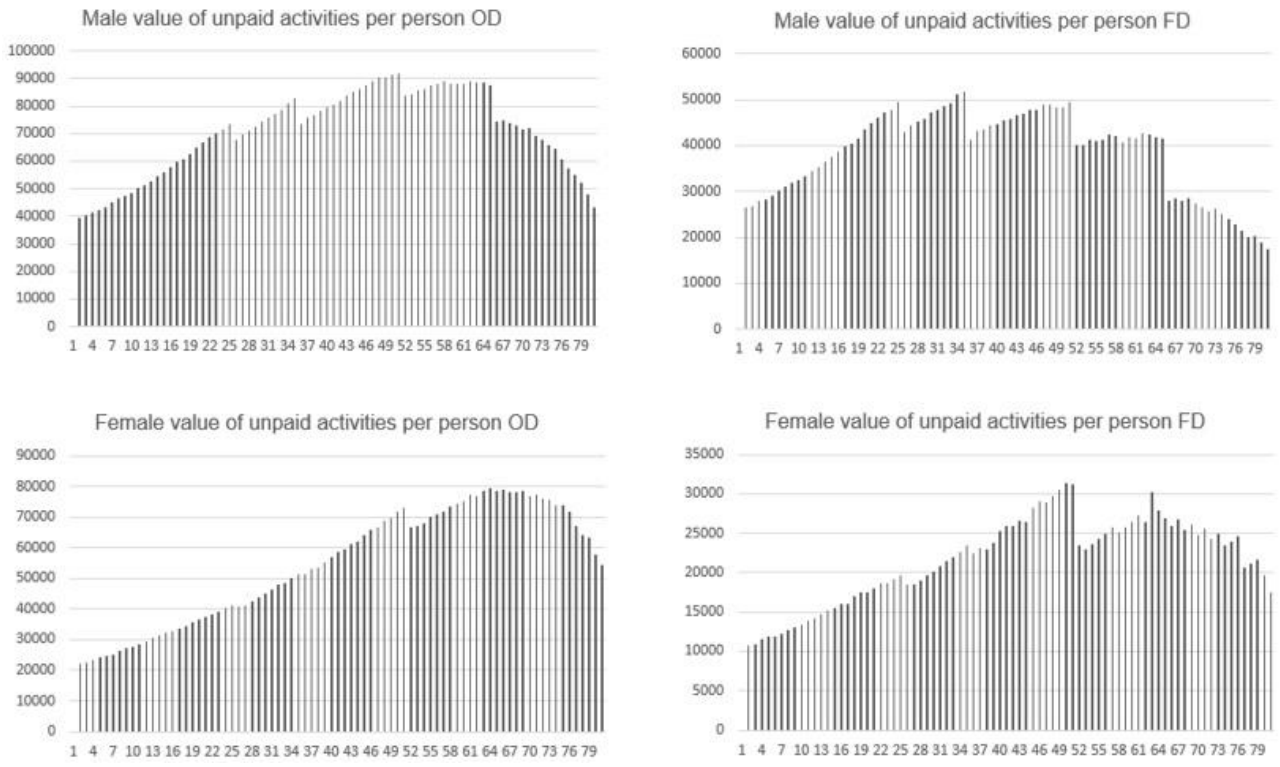

Figure 3. Potential gain in societal value due to health-related increase in unpaid work activities. Individual results by age, gender and diet scenario (OD and FD) as compared to German base case nutrition

Sources: own calculations

Table 5. Average societal value per person of gained LE by NVS II age-group, gender, diet scenario

	Male OD		Male FD		Female OD		Female FD	
Age	LE gain (years)	unpaid productivity gain (€)	LE gain (years)	unpaid productivity gain (€)	LE gain (years)	unpaid productivity gain (€)	LE gain (years)	unpaid productivity gain (€)
<= 18	14.57	49,959	8.33	33,438	8.35	28,416	3.81	13,815
19-24	14.33	69,171	8.27	46,492	8.12	38,802	3.65	18,600
25-34	12.93	75,169	7.06	47,409	7.58	45,725	3.21	20,629
35-50	10.88	83,842	5.43	46,315	7.04	62,035	2.88	26,946
51-64	7.89	87,230	3.52	41,444	5.51	73,456	1.83	25,744
65-80	4.11	63,903	1.50	24,278	3.61	71,578	1.14	23,530

Results reported in 2019 €. Net present value based on discounting with 3%. Specialists wage approach

Sources: developed by the author

Extrapolating the effects to the German 2019 population shows a total societal value due to increasing LE of 5,047bn in case of the OD and of 2,404bn in case of the FD scenario could be achieved (Table 6).

Table 6. Total societal value of gained LY'S extrapolated to German 2019 population by gender and intervention scenario (OD/FD)

	Population	Male	Female
Total in bn € **OD**	5,047	2,842	2,205
Total in bn € **FD**	2,404	1,539	865

Net present value based on discounting with 3%

Sources: developed by the author

ISSN 2786-4634 (print) ISSN 2786-4626 (online)

Discussion. The present modelling study evaluates a potential shift in dietary habits towards healthy nutrition from a societal perspective in Germany. Considering the related gain in unpaid work activities, the total estimated value of improved diet for the 2019 population level amounts to € 5,046bn in the case of an OD. Even though health gains are lower for women than for men, the societal value is higher for the female population due to higher societal contribution in terms of unpaid activities across all age groups. The potential health gains are highest for young age groups. However, the monetary societal value for young age groups is lower due to discounting of future benefits.

To the best knowledge of the author, the present study is the first analysis addressing the societal value of prevention in terms of a population wide shift towards a healthy nutrition regimen. To set the provided results into relation of previous findings, health impact evaluations of preventive nutrition interventions are to be considered. Food taxes interventions might come closest to a nationwide diet shift scenario. For instance, recent evidence shows population health effects of red meat taxes in terms of decreasing all-cause mortality, heart diseases, diabetes, and cancer (Schönbach et al., 2019). Also, taxes on sugar-added products are highly discussed in the research field. Especially when it comes to the scoping of strategies to bet increasing rates of obesity and the diabetes pandemic SSB consumption plays an important role. Taxation scenario modelling shows valuable health effects on the population level (Fernandez and Raine, 2019; Barrientos-Gutierrez et al., 2017; Pan et al., 2021). However, an evaluation of such potential health gains from a socioeconomic perspective is outstanding – a research gap, the present study aims to fill.

As every modelling analysis, the provided evidence is restricted. Limitation is determined by the scope of the underlying evidence on the relation between food intake and LE provided by Fadnes and Colleagues (Fadnes et al., 2022) as well as by data availability and associated assumptions. First, the same baseline scenario is assumed for all individuals. More precise data on food consumption of vegans, vegetarians and pescetarian would allow more precise estimation, as potential health gains would be lower for these individuals. Second, behavioural economics are not considered. In a real-world setting, food consumption is a process of fluctuation. Generally, individuals do not change diet and stick to it until end of life. As the considered health impact evaluation draws on a lifetime approach and therefore addresses average effects, these issues are taken into consideration to some extent. Third, the applied diet optimization from the literature is a one size fits all solution (Fadnes et al., 2022). The research field of nutrigenetics and personalized nutrition brings new insights and has the potential to transform dietetic practise in the future (Bush et al., 2020; Fenech et al., 2011). It can be expected that individually adapted dietary recommendations would yield even higher health gains. Finally, every future health impact assessment is related to uncertainty. Potential exogenous shocks in health, food supply as well as in the economy or society are not captured by the recent modelling study. Health shocks and food supply shocks could affect the health gain due to healthy food choices (e.g., when during crises relevant food groups are not available). Economic structural breaks would affect the monetary evaluation as, for instance, considered average wages could be influenced. Anyhow, the present research aims to provide an aggregated benchmark. To derive more detailed insights on the societal value of diet-related health gains, future research should translate the approach to other countries, specific disease areas and individualized dietary recommendations.

Conclusion. A nations health creates societal value far beyond monetary welfare as measured by GDP and related economic variables. The present study addresses population health from a societal perspective, evaluating nutrition-related increases in LE in terms of unpaid work productivity gains. The provided results underline that population nutrition plays a major role to prevent disease of civilization and related indirect costs. There is a growing body of evidence demanding policies for healthier diets on the national and international level (Geffert et al., 2022). The WHO calls on politicians to implement fiscal interventions to adapt population diet in order to overcome non-communicable diseases (WHO, 2016). The Food Environment Policy Index might be an approved methodological setting for systematic assessment of such political actions (Vandevijvere et al., 2019). Thereby, the provision of nutrition education accompanied by provision of information labels are leading actions to alter population food choices with a special emphasis on child nutrition (Perez-Cueto, 2019).

The provided societal anchor value of this study emphasizes that a change in nutrition on the population level allows early intervention to prevent diseases and thus, to induce cost savings and productivity gains in the future – stepping towards health care systems and economic structures in a sustainable framework.

Acknowledgements: I would like to thank Prof. Dr. Werner Sesselmeier and the research seminar at Rheinland-Pfälzische Technische Universität Kaiserslautern-Landau (Department for Economic Sciences) and Prof. Dr. Dennis A. Ostwald and Dr. Malina Müller from WifOR Institute (Department of Health

Economics) for valuable feedback and discussion during the study conduction. Further, I am grateful for fruitful discussion with participants of the EUHEA Conference 2022 in Oslo.

Conflicts of Interest: Authors declare no conflict of interest.

Data Availability Statement: Not applicable.

Informed Consent Statement: Not applicable.

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Запобіжні застереження в харчуванні: оцінка соціального впливу на середню тривалість життя в Німеччині

Громадське здоров'я визначає економічну стабільність і подальший розвиток. Некоректний режим харчування щорічно створює величезний тягар для здоров'я в усіх вікових групах і географічних регіонах. Харчування є одним з основних факторів подолання неінфекційних захворювань і пов'язаних з ними витрат. За даними Всесвітньої організації охорони здоров'я, існує прогалина в дослідженнях економічної ефективності політичних втручань у сферу харчування. Описане в поточній студії моделювання є першою спробою оцінити потенційний загальнонаціональний перехід до здорового харчування в загальносуспільному аспекті. Сценарне моделювання спирається на результати останніх досліджень, а також зважає на норми харчування згідно з національними статистичними даними. Потенційне збільшення середньої тривалості життя за віком і статтю внаслідок покращення харчового раціону оцінюється для населення Німеччини у 2019 році з урахуванням різних сценаріїв (оптимальний та реалістичний режими харчування). Як наслідок, покращений стан здоров'я перетворюється на суспільну цінність, що позитивно відображається на зростанні продуктивності праці за конкретною спеціалізацією. Потенційний прибуток від неоплачуваної роботи, пов'язаної з покращенням харчування, оцінюється у 5046 мільярдів євро для населення Німеччини у 2019 році за оптимального сценарію харчування. У разі реалістичного сценарію харчування середня тривалість життя нижча, але все ще цінна. На організм жінок харчування справляє менший вплив, ніж на організм чоловіків, але суспільна цінність для жінок вища через вищий суспільний внесок у неоплачувану діяльність для всіх вікових груп. Потенційна користь для здоров'я найвища серед молодих вікових груп, але грошова суспільна цінність для цих людей нижча через дисконтування майбутніх вигод. Дослідження ілюструє суспільну цінність харчування як одного з аспектів профілактики неінфекційних захворювань. Таким чином, студія надає цінну інформацію для тих, хто приймає рішення щодо розробки втручань на рівні населення, де система охорони здоров'я та економічні структури трансформуються у бік сталого розвитку.

Ключові слова: харчовий режим; національне здоров'я; запобігання; середня тривалість життя; суспільний вплив; неоплачувана продуктивність праці; непрямі витрати; стабільна система охорони здоров'я.

[i] Detailed HDI information provided at: Human Development Index (HDI) | Human Development Reports (undp.org)

[ii] WD built on food choices data from the United States (US) and the European Union (EU) (Fadnes et al., 2022).

[iii] More detailed information provided at https://www.mri.bund.de/de/institute/ernaehrungsverhalten/forschungsprojekte/nvsii/

[iv] A high-rated quality of the meta-analysis on which effect of considered food groups is built was ensured by application of AMSTAR-2 tool (Shea et al., 2017). Quality for each food group assessed using Nutri grade.

[v] According to EUROSTAT labour force survey Germany https://ec.europa.eu/eurostat/web/lfs/data/database.