Research Article

Fatty Food Consumption and Stroke Risk Among Older Adults in Indonesia: Analysis of the 2023 Indonesian Health Survey

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Abstract: In Indonesia, stroke is the leading cause of illness and death among the elderly. Dietary habits, especially fatty food intake, have been identified as changeable risk factors. Nonetheless, there is a scarcity of national data on this relationship among older Indonesian adults. This study sought to investigate the relationship between fatty food intake and stroke occurrence in elderly Indonesians, utilizing data from the 2023 Indonesian Health Survey (Survey Kesehatan Indonesia or SKI). This cross-sectional study was performed using secondary data from SKI 2023, encompassing 97,339 participants aged 60 years and above. The primary outcome was whether a stroke diagnosis was present (yes/no) and the key independent variable was the consumption of fatty foods (yes/no). Additional variables considered were age, gender, education, marital status, employment, residence, and alcohol use. Weighted descriptive statistics, chi-square tests, and binary logistic regression were conducted using STATA 14.1, with sampling weights applied. The stroke prevalence among elderly participants was 3.2%. The bivariate analysis revealed a significant association between fatty food consumption and stroke (p < 0.001). Multivariate logistic regression showed that elderly individuals who avoided fatty foods had a notably reduced risk of stroke (OR = 0.51, 95% CI: 0.45–0.58, p < 0.001). Alcohol consumption also had a protective effect (OR = 0.22, 95% CI: 0.12–0.43, p < 0.001). There is a significant association between fatty food consumption and stroke among the elderly population in Indonesia. Public health strategies encouraging healthier eating habits could potentially lower the stroke risk in this susceptible group

Keywords: Elderly; Fatty Foods; Indonesia; SKI 2023; Stroke

1. Introduction

Stroke is the leading cause of mortality and prolonged disability worldwide, exerting considerable health, social, and economic effects, particularly in the elderly population. The World Health Organization (WHO) reports that stroke is responsible for about 11% of deaths globally and has a disproportionate impact on people in low- and middle-income nations, such as Indonesia.[1, 2]. According to the 2018 Basic Health Survey (Riskesdas) in Indonesia, the national stroke prevalence was found to be 10.9 per 1,000 people, with most cases occurring in those aged 60 and above. [3]. The elderly are increasingly vulnerable to non-communicable diseases (NCDs), such as stroke, owing to an aging population and changing lifestyles.

Among the numerous adjustable risk factors for stroke, diet, particularly intake of fatty foods, is of significant importance. Diets rich in saturated fats, trans fats, and cholesterol lead to the onset of atherosclerosis, high blood pressure, and dyslipidemia, which are key contributors to stroke.[4-6]. The shift towards processed and calorie-rich foods has led to an

increase in the consumption of fatty foods among city dwellers and older adults. [7]. Research has shown a link between diets high in fat and an increased risk of stroke, particularly in older adults who are already at a physiological disadvantage.[8, 9]. Nevertheless, dietary risk factors are frequently overlooked in stroke prevention strategies for older adults..

International evidence supports a connection between the intake of fatty foods and the occurrence of strokes.[5, 6, 10], research examining this link in the elderly population of Indonesia is still scarce. Most studies conducted in Indonesia tend to address cardiovascular disease in general or consider dietary risk factors collectively, without specifically isolating the impact of fatty foods.[11]. Moreover, only a limited number of studies have employed large-scale, nationally representative data to investigate this relationship within the framework of varied sociodemographic characteristics. This shortfall impedes the creation of targeted, evidence-based nutritional interventions aimed at preventing stroke in elderly individuals.

This study fills a gap in the literature by utilizing data from the 2023 Survey Kesehatan Indonesia (SKI), a comprehensive national health survey, to explore the link between the intake of fatty foods and the incidence of stroke among older adults in Indonesia. To the best of our knowledge, this is the first study to employ SKI 2023 data to evaluate this connection through a weighted analysis to provide national estimates. The results are anticipated to offer fresh perspectives on preventing stroke related to diet and to aid in policy-making efforts aimed at enhancing health outcomes for the elderly in Indonesia.

2. Literature Review

Stroke continues to be a significant global public health issue, particularly in older adults. The World Health Organization (WHO) reports that stroke ranks as the second most common cause of death and is a leading contributor to disability worldwide, with the majority of cases occurring in low- and middle-income nations.[1, 2]. In Indonesia, the incidence of stroke among people aged 60 and above is on the rise, influenced by an aging population and lifestyle-related risk factors.[3].

Diet is one of the most thoroughly researched modifiable risk factors for stroke, with a particular emphasis on the intake of foods high in fat and cholesterol. Foods that are high in fat, especially those containing saturated and trans fats, are known to play a role in the development of atherosclerosis, thereby elevating the risk of ischemic stroke.[4-6]. Consuming a diet rich in saturated fats can elevate levels of low-density lipoprotein (LDL) cholesterol, potentially resulting in the accumulation of plaque in the arteries and increasing the risk of cerebrovascular incidents.[12-14]. In a prospective study conducted by Hu et al. (2000), it was discovered that consuming large amounts of saturated and trans fats was strongly associated with a higher risk of stroke in both men and women. [5, 6, 10].

Conversely, a diet abundant in fruits, vegetables, whole grains, and unsaturated fats, such as omega-3 fatty acids, is associated with a decreased risk of stroke. For example, the Mediterranean diet has been proven to reduce stroke occurrence by enhancing lipid profiles and minimizing inflammation.[10]. Meta-analyses demonstrate that substituting saturated fats with polyunsaturated fats considerably lowers the likelihood of cardiovascular incidents, such as stroke. [12, 15].

Eating habits significantly influence health outcomes in older adults. The combination of age-related physiological changes, decreased physical activity, and the presence of multiple health conditions makes this group more susceptible to the negative impacts of inadequate nutrition.[16]. Research conducted in Asia, including Indonesia, indicates that urban seniors are increasingly adopting high-fat diets due to the widespread availability of processed and fast foods.[11]. The phenomenon known as the "nutrition transition" has played a role in the dual challenge of malnutrition and the rise of non-communicable diseases, such as stroke. [7].

Besides diet, lifestyle choices such as alcohol consumption are also associated with stroke risk. Drinking too much alcohol can raise blood pressure, trigger irregular heartbeats, and result in hemorrhagic strokes.[8]. Although consuming a moderate amount might offer some protection, the line between its benefits and potential harm is thin and differs among the various groups. [17, 18].

3. Propose Method
Study Design and Data Source
This study utilized a cross-sectional approach, drawing on secondary data from the 2023 Indonesian Health Survey (Survey Kesehatan Indonesia or SKI 2023), which was carried out by the Ministry of Health of the Republic of Indonesia. SKI 2023 is a survey with a national representation aimed at evaluating health conditions, behaviors, and healthcare access among the Indonesian populace, including senior citizens. The dataset comprises detailed health and demographic data of individuals aged 60 years and above from all provinces in Indonesia.

Study Population
The study involved participants aged 60 years and older who were part of the SKI 2023. The final analysis included 97,339 individuals with complete information on stroke status and other relevant factors.

Variables
The dependent variable was the occurrence of stroke, determined by whether a health professional had ever diagnosed the respondent with a stroke. Responses were classified as "Yes" (coded as 1) or "No" (coded as 0). The primary independent variable was fatty food intake based on self-reported information. Participants were classified as "Yes" (1) if they consumed fatty foods and "No" (0) if they did not. Additional covariates included age groups: 60–69, 70–79, and 80–112 years. Gender: male or female. Educational level: No education, elementary school, junior high school, senior high school, and college. Marital status: single, married, or divorced/widowed. Employment status: currently working or not working. Residence: urban or rural. Alcohol consumption: yes or no

Statistical Analysis
Descriptive statistics were used to display the weighted frequencies and percentage distributions of the study variables. To explore the relationship between stroke status and each independent variable, chi-square tests were used in bivariate analysis. Sampling weights from the SKI 2023 dataset were applied to all analyses to ensure national representativeness and to account for the complex survey design. Variables with a p-value of less than 0.05 in the bivariate analysis were included in the multivariate analysis. Binary logistic regression was used to determine the adjusted relationship between fatty food consumption and stroke while controlling for potential confounding factors. The results were expressed as weighted odds ratios (ORs) with 95% confidence intervals (CIs). All statistical analyses were performed using STATA version 14.1, and a p-value of less than 0.05 was deemed statistically significant.

Ethical Consideration
This study used secondary data from SKI 2023, which is accessible to the public and has been anonymized. As no personal information that could identify individuals was involved, obtaining ethical approval was unnecessary. The dataset's usage adhered to the data-sharing policy set by the Ministry of Health of the Republic of Indonesia

4. Results
Table 1 presents the demographic characteristics of the elderly population in Indonesia based on the 2023 SKI data (n = 97,339). The majority of elderly individuals were aged 60–69 years (68.3%), followed by those aged 70–79 years (24.9%), and 80 years and above (6.8%). In terms of sex distribution, 51.0% were female and 49.0% were male. Regarding educational attainment, 42.0% of the elderly had completed elementary education, whereas 26.7% had no formal education. Smaller proportions completed junior high school (10.7%), senior high school (13.5%), or college (7.0%). The majority of respondents were married (68.4%), followed by divorced (30.4%) and single (1.3%). Employment status showed that 67.8% of the elderly were still working, whereas 32.2% were not. In terms of residence, slightly more than half lived in urban areas (54.1%), with the remainder residing in rural areas (45.9%). Health behavior data indicated that only 1.6% of the elderly reported alcohol consumption, whereas 98.4% did not. A large proportion (94.6%) consumed fatty foods, whereas 5.4% did not. The prevalence of stroke among the elderly was 3.2%, whereas 96.8% reported no history of stroke.

Table 1. Frequency Distribution of Characteristic elderly in Indonesia (n = 97,339)

Variable	Frequency (n)	Percent (%)
Age Group		
60-69	66435	68.3
70-79	24282	24.9
80-112	6622	6.8
Gender		
Male	47662	49.0
Famale	49677	51.0
Educational Level		
None	25982	26.7
Elementary	40880	42.0
Junior High School	10431	10.7
Senior High School	13188	13.5
College	6858	7.0
Marital Status		
Single	1222	1.3
Married	66554	68.4
Divorced	29563	30.4
Job		
Work	66010	67.8
Doesn't Work	31329	32.2
Residence		
Urban	52671	54.1
Rural	44668	45.9
Alcohol Consumption		
Yes	1522	1.6
No	95817	98.4
Consumption Fatty Foods		
Yes	92107	94.6
No	5232	5.4
Stroke		
Yes	3102	3.2
No	94237	96.8

Table 2 illustrates the bivariate analysis of demographic and behavioral variables in relation to stroke incidence among the elderly. The association between age and stroke was statistically significant (p = 0.001), with stroke being more prevalent among individuals aged 70–79 years (1.0%) and 80 years and older (0.2%) than in younger age groups. Sex was also significantly associated with stroke (p = 0.001), with a slightly higher proportion of males (1.8%) than females (1.4%). Educational level showed a significant relationship with stroke (p = 0.001); those with no formal education had the highest proportion of stroke (0.8%), whereas college graduates had the lowest (0.3%). Employment status was significantly associated with stroke (p = 0.001), with similar proportions between those who worked (1.6%) and those who did not (1.6%). Place of residence was significantly associated with stroke (p = 0.001), with urban residents having a higher stroke prevalence (2.0%) than rural residents (1.1%). Alcohol consumption also showed a significant association (p = 0.001); although only a small percentage of the elderly reported consuming alcohol, they had a higher proportion of stroke (0.0% vs. 3.2% among non-drinkers). Fatty food consumption was significantly associated with stroke (p = 0.001). Among those who consumed fatty foods, 2.8% had experienced a stroke compared to only 0.4% of those who did not

Table 2. Association between Consumption Fatty Foods and Stroke in the Elderly in Indonesia (n = 97,339)

Variables	Stroke				p-Value
	Yes		**No**		
	n=3.102	**(03.2%)**	**n=94.237**	**(96.8%)**	
Age Group					0.001*
60-69	1913	2.0%	64522	66.3%	
70-79	961	1.0%	23321	24.0%	
80-112	228	0.2%	6394	6.6%	
Gender					0.001*
Male	1723	1.8%	45939	47.2%	
Famale	1379	1.4%	48298	49.6%	
Educational Level					0.001*
None	732	0.8%	25250	25.9%	
Elementary	1144	1.2%	39736	40.8%	
Junior High School	355	0.4%	10076	10.4%	
Senior High School	550	0.6%	12638	13.0%	
College	321	0.3%	6537	6.7%	
Marital Status					0.098

Single	27	0.0%	1195	1.2%	
Married	2152	2.2%	64402	66.2%	
Divorced	3102	3.2%	94237	96.8%	
Job					0.001*
Work	1571	1.6%	64439	66.2%	
Doesn't Work	1531	1.6%	29798	30.6%	
Residence					0.001*
Urban	1988	2.0%	50683	52.1%	
Rural	1114	1.1%	43554	44.7%	
Alcohol Consumption					0.001*
Yes	10	0.0%	1512	1.6%	
No	3092	3.2%	92725	95.3%	
Consumption Fatty Foods					0.001*
Yes	2724	2.8%	89383	91.8%	
No	378	0.4%	4854	5.0%	

*p=<0.05

The results of the logistic regression analysis are presented in Table 3. After controlling for confounding variables, alcohol consumption and fatty food intake remained significantly associated with stroke in the elderly. Elderly individuals who did not consume alcohol had a significantly lower risk of stroke than those who did (OR = 0.22, 95% CI: 0.12–0.43, p = 0.001). Similarly, those who did not consume fatty foods had a lower likelihood of stroke (OR = 0.51, 95% CI: 0.45–0.58, p = 0.001) than those who did. These findings suggest that both alcohol and fatty food consumption are important behavioral risk factors for stroke among the elderly population in Indonesia

Table 3. Logistic regression

Variable	Odds Ratio (OR)	Confidence Interval (CI)	p-Value
Consumption Alcohol			
Yes	1.00	-	-
No	0.22	0.12-0.43	0.001*
Consumption Fatty Foods			
Yes	1.00	-	-
No	0.51	0.45-0.58	0.001*

5. Discussion

This study explored the link between the intake of fatty foods and the occurrence of stroke among older adults in Indonesia, utilizing data from the 2023 Indonesian Health Survey (SKI 2023), which is representative of the national population. The results indicated a statistically significant connection between the consumption of fatty foods and stroke, showing that elderly individuals who refrained from eating fatty foods had a notably reduced risk of stroke. This relationship remained significant even after accounting for various confounding factors such as age, gender, education level, marital status, employment status, place of residence, and alcohol consumption.

This research supports previous studies indicating that a high intake of saturated fats and cholesterol, commonly found in fatty foods, contributes to the development of atherosclerosis and increases the likelihood of an ischemic stroke.[19, 20]. Consuming too many fatty foods can result in dyslipidemia, high blood pressure, and obesity, all of which are known risk factors for heart and brain-related diseases.[21, 22]. The American Heart Association suggests that substituting saturated fats with healthier fats can reduce the risk of stroke and other heart-related diseases. [23].

Additionally, the increased incidence of stroke among individuals who consume fatty foods may be associated with poor dietary habits. Prior studies indicate that older adults with high-fat diets are more prone to having other health issues like diabetes and hypertension, which further heighten the risk of stroke.[8, 24]. Conversely, consuming a diet abundant in fruits, vegetables, whole grains, and healthy fats, such as the Mediterranean diet, has been shown to lower the risk of stroke and promote healthy aging. [25, 26].

The study also revealed that additional demographic elements, such as being older, having a lower level of education, and living in urban areas, were strongly linked to the prevalence of stroke. These results are consistent with global trends, where aging populations and reduced health literacy contribute to a higher incidence of strokes.[27, 28]. Older adults

living in urban areas might have greater access to processed and high-fat foods, which can increase their risk.[29, 30].

It is noteworthy that alcohol consumption is significantly linked to stroke, even though the number of elderly individuals who drink alcohol is relatively small. While the effects of moderate alcohol consumption are debated in academic discussions, it is well-established that excessive drinking can elevate blood pressure and increase the risk of stroke, especially hemorrhagic types.[17, 31].

This study has several limitations. First, its cross-sectional nature hinders the ability to establish causal links between fatty food consumption and stroke occurrence. Longitudinal and cohort studies are required to confirm this sequence and causality. Second, relying on self-reported data for both dietary habits and stroke diagnosis could lead to recall bias and misclassifications. Furthermore, the assessment of fatty food consumption was restricted to a simple yes/no response, without detailing the type, amount, or frequency of intake, which limited the comprehensiveness of the dietary analysis. Finally, other possible confounding variables, such as physical activity, medication use, and existing health conditions, were not included in the dataset and might have affected the observed relationships. Despite these limitations, this study provided significant insights into public health. This is the first study to utilize nationally representative data from SKI 2023 to investigate the dietary risk of stroke among older Indonesians. These results underscore the necessity for targeted nutritional education and dietary interventions to reduce fatty food consumption among the elderly, especially in urban areas where processed foods are more common. Health policymakers and practitioners should integrate diet-focused strategies into national stroke prevention programs to alleviate the increasing burden of stroke in Indonesia's aging population.

6. Conclusions

This study offers evidence on a national scale of a notable link between the consumption of fatty foods and the likelihood of stroke among older adults in Indonesia. Drawing on data from the 2023 Indonesian Health Survey, this study revealed that elderly individuals who avoid fatty foods are significantly less prone to experiencing a stroke. These findings highlight the critical role of dietary habits in preventing stroke, particularly in an aging population that is increasingly exposed to unhealthy eating patterns. Public health initiatives advocating for reduced fatty food consumption and promoting healthier eating habits are crucial for decreasing stroke risk and enhancing the quality of life of older Indonesians. Future studies employing longitudinal methods and comprehensive dietary evaluations are needed to bolster causal conclusions and guide specific nutritional interventions.

References

[1] American Heart Association. (2023). Diet and Lifestyle Recommendations.

[2] Astrup, A., et al. (2020). Saturated Fats and Health: A Reassessment and Proposal for Food-Based Recommendations: JACC State-of-the-Art Review. Journal of the American College of Cardiology, 76(7), 844–857. https://doi.org/10.1016/j.jacc.2020.05.077

[3] Biddinger, K. J., et al. (2022). Association of Habitual Alcohol Intake With Risk of Cardiovascular Disease. JAMA Network Open, 5(3), e223849. https://doi.org/10.1001/jamanetworkopen.2022.3849

[4] Boehme, A. K., Esenwa, C., & Elkind, M. S. (2017). Stroke Risk Factors, Genetics, and Prevention. Circulation Research, 120(3), 472–495. https://doi.org/10.1161/CIRCRESAHA.116.308398

[5] Estruch, R., et al. (2013). Primary prevention of cardiovascular disease with a Mediterranean diet. New England Journal of Medicine, 368(14), 1279–1290. https://doi.org/10.1056/NEJMoa1200303

[6] Estruch, R., et al. (2018). Primary Prevention of Cardiovascular Disease with a Mediterranean Diet Supplemented with Extra-Virgin Olive Oil or Nuts. New England Journal of Medicine, 378(25), e34.

[7] Estruch, R., et al. (2018). Primary Prevention of Cardiovascular Disease with a Mediterranean Diet Supplemented with Extra-Virgin Olive Oil or Nuts. New England Journal of Medicine, 378(25), e34. https://doi.org/10.1056/NEJMoa1800389

[8] Feigin, V. L., et al. (2024). Global, regional, and national burden of stroke and its risk factors, 1990–2021: a systematic analysis for the Global Burden of Disease Study 2021. The Lancet Neurology, 23(10), 973–1003. https://doi.org/10.1016/S1474-4422(24)00369-7

[9] Feigin, V. L., et al. (2025). World Stroke Organization: Global Stroke Fact Sheet 2025. International Journal of Stroke, 20(2), 132–144. https://doi.org/10.1177/17474930241308142

[10] He, K., et al. (2003). Dietary fat intake and risk of stroke in male US healthcare professionals: 14 year prospective cohort study. BMJ, 327(7418), 777–782. https://doi.org/10.1136/bmj.327.7418.777

[11] Kang, Z. Q., Yang, Y., & Xiao, B. (2020). Dietary saturated fat intake and risk of stroke: Systematic review and dose-response meta-analysis of prospective cohort studies. Nutrition, Metabolism and Cardiovascular Diseases, 30(2), 179–189. https://doi.org/10.1016/j.numecd.2019.09.028

[12] Katan, M., & Luft, A. (2018). Global Burden of Stroke. Seminars in Neurology, 38(2), 208–211. https://doi.org/10.1055/s-0038-1649503

[13] Lakkur, S., & Judd, S. E. (2015). Diet and Stroke: Recent Evidence Supporting a Mediterranean-Style Diet and Food in the Primary Prevention of Stroke. Stroke, 46(7), 2007–2011. https://doi.org/10.1161/STROKEAHA.114.006306

[14] Maki, K. C., Dicklin, M. R., & Kirkpatrick, C. F. (2021). Saturated fats and cardiovascular health: Current evidence and controversies. Journal of Clinical Lipidology, 15(6), 765–772. https://doi.org/10.1016/j.jacl.2021.09.049

[15] Ministry of Health, Indonesia. (2018). Basic Health Research (Riskesdas).

[16] Mozaffarian, D., Micha, R., & Wallace, S. (2010). Effects on coronary heart disease of increasing polyunsaturated fat in place of saturated fat: a systematic review and meta-analysis of randomized controlled trials. PLoS Medicine, 7(3), e1000252. https://doi.org/10.1371/journal.pmed.1000252

[17] O'Donnell, M. J., et al. (2016). Global and regional effects of potentially modifiable risk factors associated with acute stroke in 32 countries (INTERSTROKE): a case-control study. The Lancet, 388(10046), 761–775. https://doi.org/10.1016/S0140-6736(16)30506-2

[18] Popkin, B. M. (2006). Global nutrition dynamics: the world is shifting rapidly toward a diet linked with noncommunicable diseases. American Journal of Clinical Nutrition, 84(2), 289–298. https://doi.org/10.1093/ajcn/84.2.289

[19] Popkin, B. M. (2014). Nutrition, Agriculture and the Global Food System in Low and Middle Income Countries. Food Policy, 47, 91–96. https://doi.org/10.1016/j.foodpol.2014.05.001

[20] Powell-Wiley, T. M., et al. (2021). Obesity and Cardiovascular Disease: A Scientific Statement From the American Heart Association. Circulation, 143(21), e984–e1010. https://doi.org/10.1161/CIR.0000000000000973

[21] Rachmi, C. N., Li, M., & Baur, L. A. (2017). Overweight and obesity in Indonesia: prevalence and risk factors—a literature review. Public Health, 147, 20–29. https://doi.org/10.1016/j.puhe.2017.02.002

[22] Ronksley, P. E., et al. (2011). Association of alcohol consumption with selected cardiovascular disease outcomes: a systematic review and meta-analysis. BMJ, 342, d671. https://doi.org/10.1136/bmj.d671

[23] Siri-Tarino, P. W., et al. (2010). Meta-analysis of prospective cohort studies evaluating the association of saturated fat with cardiovascular disease. American Journal of Clinical Nutrition, 91(3), 535–546. https://doi.org/10.3945/ajcn.2009.27725

[24] Soto-Cámara, R., et al. (2020). Age-Related Risk Factors at the First Stroke Event. Journal of Clinical Medicine, 9(7), 2233. https://doi.org/10.3390/jcm9072233

[25] Stamler, J., et al. (1999). Low risk-factor profile and long-term cardiovascular and noncardiovascular mortality and life expectancy: findings for 5 large cohorts of young adult and middle-aged men and women. JAMA, 282(21), 2012–2018. https://doi.org/10.1001/jama.282.21.2012

[26] Tonnang, H., et al. (2021). Leveraging data, models & farming innovation to prevent, prepare for & manage pest incursions: Delivering a pest risk service for low-income countries; Food Systems Summit Brief Prepared by Research Partners of the Scientific Group for the Food Systems Summit.

[27] Tosti, V., Bertozzi, B., & Fontana, L. (2018). Health Benefits of the Mediterranean Diet: Metabolic and Molecular Mechanisms. Journal of Gerontology: Series A, 73(3), 318–326. https://doi.org/10.1093/gerona/glx227

[28] Volkert, D., et al. (2019). ESPEN guideline on clinical nutrition and hydration in geriatrics. Clinical Nutrition, 38(1), 10–47. https://doi.org/10.1016/j.clnu.2018.05.024

[29] Wang, F., et al. (2021). Abstract 9343: Dietary Fat Intake and the Risk of Stroke: Results from Two Prospective Cohort Studies. Circulation, 144(Suppl_1), A9343–A9343. https://doi.org/10.1161/circ.144.suppl_1.9343

[30] World Stroke Organization. (2022). Global Stroke Fact Sheet 2022.

[31] Zoellner, E. R., et al. (2023). Dietary Intake and Quality among Stroke Survivors: NHANES 1999–2018. The Journal of Nutrition, 153(10), 3032–3040. https://doi.org/10.1016/j.tjnut.2023.08.015