RESEARCH ARTICLE

Journal of Extension Education
Vol. 35 No.4, 2023
DOI: https://doi.org/10.26725/JEE.2023.4.35.7108- 7116

Awareness and Consumption of Millets among Young Adults of Rajasthan and Uttar Pradesh

Ragini Ranawat, Kesar Chayal and Lalita Vatta

ABSTRACT

The present study was conducted with the objective to identify the awareness levels and consumption of millets among young adults from Rajasthan and Uttar Pradesh in India . A total of 232 young adults between the ages of 18 and 25 years were interviewed in this concurrent nested design-based study. The objective of this study was to identify the awareness of millets and investigate the consumption patterns of millets among young adults. The results showed that although 80.20 percent of the respondents were aware about millets, in general, only 23.20 percent knew of more than 5 types of millets. The recognition rate was lowest for Barnyard millet (35.60%). The consumption pattern showed majority of the respondents were consuming millets but the frequency was only 'few times a year'. The study concluded that young adults need to be made aware about the importance and ways of consuming millets for better mainstreaming of millets among the population.

Keywords: *Millets; Awareness; Consumption pattern; Young adults; Recognition rate; Uttar Pradesh; Rajasthan*

INTRODUCTION

India is ready to reap the demographic dividend of being a country of the youth. With the current median age in the country being 29 years , Indians are looking at a further rise in the median age to 36 years by 2036, translating into a huge working and able population in the coming decades. This also means that the youth of the country will be at the heart of every decision and policy. Of late, India has been targeting issues like malnutrition, climate change and declining agricultural income by promoting millets. However, it's a long road ahead as the country's palette is still highly cereal based and subsequently the farming community and the markets are yet getting acquainted with mainstreaming millets.

Millets are typically sorghum, pearl millet, and a variety of small millets in India and other Asian and African countries (Vetriventhan et al., 2020). India is the largest producer of millets in the world. Rajasthan, Uttar Pradesh, Karnataka, Maharashtra, Madhya Pradesh and Haryana are the top producers of millets in the country, contributing to 79.60 per cent of the entire millets' production (https://apeda.gov.in/; 2023). Rajasthan and Uttar Pradesh are the largest states of India in terms of geographical

Department of Home Science, University of Rajasthan, Talvandi, Jaipur, Rajasthan 302004

Submitted: 23.07.2024 **Accepted:** 27.01.2025

area and population respectively. With the top producers and highest population, these two states can be the flag bearers in popularising and mainstreaming millets.

Millets are considered an ideal food for humans because of their high nutritive value. Millets are frequently referred to as "good food for both individuals and the planet" (Kane-Potaka et al., 2021). In spite of all these aspects, consumption of millets has decreased over the last two to three decades. Despite accounting for 10% of India's food grain basket and producing 18 million metric tonnes per year, it is not consumed in the same proportion as rice and wheat (Kane-Potaka and Kumar (2019); Basavaraj et al. (2010); Parthasarathy Rao et al. (2010)). Climate change is a factor that has been demanding the efforts of policy makers across the globe. Less resource intensive crops like millets (Chakraborti et al., 2023) are being looked at as sustainable intervention to modern agriculture. Targeting millets' farmers and farming systems can have far reaching effects. In a review by Jaiswal et. al. (2023) on 'revitalizing agriculture extension services for millets', it was concluded that reviving millet agriculture extension services is essential for encouraging sustainable millet farming methods and raising millet farmers' standard of living.

Study of the existing consumption patterns of millets among various sections of the society can grant insights into loop holes and opportunities for incorporating the right kind of products and practices favouring enhanced use of millets. In a study on Uttarakhand's rural women by Jalal and Pandey (2024), use of millets was only found to be restricted in winter seasons and as chapatis, thus highlighting the need for targeted popularization of innovative use of this miracle crop. It is often observed that consumers have a foundational understanding of millets and their value-added products but lack in-depth knowledge about their nutritional benefits, uses. There is a need for education and information dissemination to bridge the knowledge gap and enhance consumer understanding (Katiyar, 2024). Through systemic reviews (Ghosh et, al., 2024) it was found that there has been enough gap between merely collecting the nutritional profile of millets and making millets the staple grains in Indian scenario. Efforts will also have to be made in understanding the determinants of food choices of various sections of the society. For instance, in case of adults, nutritive value of foods, brand and taste are the most influential factors of food choices, however, social factors like company for the meal and cost also determined the foods to be eaten (Mediratta and Mathur, 2023). Public health policy ought to consider the factors that influence food choices to effectively alter the food environment by enhancing the accessibility of appealing and nutritious options, while also being mindful of costs.

With time, the consumer preferences and eating patterns have changed. The consumer perceptions and attitudes towards popular dietary products and the factors influencing these aspects need to be studied for gaining a deeper insight that can be helpful in designing strategies for inclusion of millets among the masses. Youth of the country is the driving force behind the major trends, be it food, media or lifestyle. Investigating young adults with respect to knowledge and attitude about millets can be important in planning relatable strategies. Hence, the present study was conducted with the objective to identify the knowledge and awareness about millets and it types, and consumption behaviour of young adults of Rajasthan and Uttar Pradesh.

METHODOLOGY

The study was conducted through a large sample survey to collect primary data on knowledge and awareness about millets and it types, consumption behaviour of the target

population which was young adults of the two major states of India. Consumption behaviour depicts the ways in which a particular food item is used and eaten, thus providing insights on how millets can be promulgated in the dietary habits of the larger population. Food consumption behaviour is also holistically determined by numerous factors like properties of foods, personal & environmental factors and decision process (Duralia, 2023). The data collected were primarily quantitative in nature, with the only qualitative aspect being responses about millets at the time of recording recognition rate. Concurrent nested design approach was followed.

A structured questionnaire was developed to gather information about the consumption and awareness of millets. It included the Food Frequency Questions (FFQs) on millets. Food Frequency Questions are the most common dietary instruments used to record habitual dietary intake and easy to administer on large populations (Willett, 2013). Questions on awareness about millets were dichotomous in nature. The tool also presented a checklist with questions on 'source of awareness about millets', 'health benefits of millets', 'reasons and mode of consuming/not consuming millets' etc. Consultation of an expert panel was taken to test the validity and clarity of the questions. Pilot study with 30 subjects was done before data collection to validate the questions and identify any issues with the understanding of the questions. To minimize the measurement errors, the questionnaire was then improved and finalised upon incorporation of the suggestions and comments of the pilot study.

The survey was conducted in the month of March – April 2023, by contacting young adults at shopping malls and education centres like colleges, universities, coaching centres etc. The survey personnel asked the questions about awareness, perceived health benefits and consumption behaviour of millets, in person to the respondents.

Survey Participants

The respondents were young adults in age group of 18 to 25 years residing in Rajasthan and Uttar Pradesh. Convenience sampling method was used to contact the target population. To contact the young adults in large numbers, they were approached in shopping malls and education centres. To ensure voluntary participation, the respondents were informed about the objectives of the study and guaranteed about the confidentiality of their data. Informed consent was obtained from the participants on the standard format, before interview. Altogether, five survey personnel were engaged in data collection.

Data Analysis

The data were obtained from 238 respondents, but upon organizing and coding of data, the final sample size of the study was 231. To test the significant difference between the various variables and inter-state difference, Z statistics were implemented.

FINDINGS AND DISCUSSION

Background Information

Majority of the respondents were undergraduates (56.40 %), females (67.42 %), resided in urban areas (77.20 %) and un-married (93.10 %). About 57.36 per cent subjects were from Rajasthan and 42.64 per cent subjects were from Uttar Pradesh.

Awareness about Millets

80.20 percent of the respondents agreed to be aware of millets, however, only 23.20 percent of the subjects were aware of more than five types of millets. About 41.10 per cent of the respondents knew about 3-5 types of millets.

Source of Awareness about Millets

Majority of the respondents reported that they came to know about millets through family members (51.50 %). Rest of the sources like teachers (15.8 %), books (12.90 %) and T.V. did not play a big role behind the awareness about millets in the young adults. Even in this age of social media, it did not serve as a big platform in terms of raising awareness about millets for the study participants. These findings were especially interesting because it presents a big scope for social media platforms and televisions in spreading awareness about millets and its benefits, particularly for the youth. The findings in an international comparative study on the role of social media in increasing public health awareness during COVID-19 pandemic by Abuhashesh et al (2021) showed a positive relationship between behavioural change and public health awareness during COVID-19 in Jordan and Poland, with components of social media campaigns which included the type of platform, type of message and message source sender.

Recognition of Millets

Pictures of seven types of millets were shown to the respondents for recognition. The respondents were asked to name the millets shown in the pictures. The recognition of Pearl Millet (*Bajra*) was highest as 71.30 percent of the respondents correctly named the picture, followed by Sorghum (*Jowar*) (64.40 %), Finger Millet (Ragi) (60.40 %), Little Millet (*Kutki*) (46.50 %) and Foxtail Millet (*Kangani*) (45.50 %). The recognition was least for Kodo Millet (*Kodra*) (36.60 %) and Barnyad Millet (*Sanwa*) (35.60 %). The recognition rate for Pearl Millet (*Bajra*) ($z=1.34$; $p<0.05$), Sorghum (*Jowar*) ($z=2.98$; $p<0.01$), Finger Millet (Ragi) ($z=1.12$; $p<0.05$) and Little Millet (*Kutki*) ($z=0.97$; $p<0.05$) was found to be significantly higher in respondents from Rajasthan (76.31 %, 69.84 %, 63.18 % and 48.73%) than Uttar Pradesh (66.29 %, 58.96 %, 57.62 % and 44.27 %). However, the recognition rate was lower for Foxtail Millet (*Kangani*), Kodo Millet (*Kodra*) and Barnyad Millet (*Sanwa*) in respondents from Rajasthan (43.46 %, 35.28 % and 33.94 %) than Uttar Pradesh (47.54 %, 37.92 % and 37.26 %). Responses like, "I did not know maize doesn't belong to the millets category, was in the practice of incorporating maize in diet, considering it was a nutritious millet!" or "I thought *Jau* (Barley) is a millet" and "I have heard a lot about *Bajra* and Ragi but never got a chance to actually see and register the grain and how it looks or feels" were also recorded by the respondents upon looking at the pictures of various millets.

In a survey study (Kane-Potaka et al., 2021) aimed to understand the practices of consuming millets and its public knowledge in urban areas, in which pictures of finger millets, pearl millets and sorghum were used to identify the recognition rate among the respondents. It was found that sorghum had the highest recognition rate followed by finger millet. Also, respondents from the age group of below 20 years had higher recognition of these crops, than other age groups.

Awareness about Health Benefits of Millets

A large percentage of the respondents were aware of millets. Upon enquiring about the health benefits of millets, highest percentage of the subjects reported to be aware about millets being high in fibre (77.20 %) ($z=3.18$; $p<0.01$) and good for diabetics (66.30 %) and for heart health (66.30 %). A good 60.40 percent of the respondents considered millets to be good in iron content. Similar percentage of subjects found millets to be good for weight loss (53.50 %) and high in calcium (51.50 %). Less than half of the participants found millets to be good for pregnant women (49.50 %).

This transition phase during which perceptions of millets are changing and there is greater health consciousness (Umanath et al., 2018) is the right stage to assess current knowledge, perceptions, and practices related to millets, which will lay the foundation for a plan to promote millets as a staple effectively.

Frequency of Millets Consumption

The frequency of consumption of millets was identified through Food Frequency Questions and the results are presented in Figure 1.

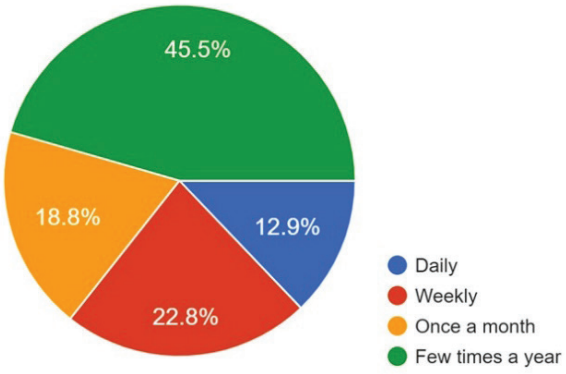

Figure.1: Frequency of Millets Consumption

The frequency of consumption of millets was identified through Food Frequency Questions. The results were not encouraging . Only about a quarter (22.80 %) of the respondents reported to consume millets weekly. About 19 per cent of the subjects consumed millets once a month and only about 13 percent of the participants consumed millets daily. Highest segment of the subject group consumed millets only few times a year (45.50 %).

State-wise Differences in Millet Consumption

There was also state wise difference in millet consumption. Participants from Rajasthan had a significantly higher percentage consuming millet daily (15.3 %) ($z= 2.34$, $p<0.05$) as compared to Uttar Pradesh residing subjects (10.50 %). The weekly consumers of millets were also significantly higher in Rajasthan (28.10 %) ($z= 4.18$, $p<0.05$) as compared to Uttar Pradesh (17.50 %).

Mode of Millets Consumption

The mode of consumption of millets among the young adults of Rajasthan and Uttar Pradesh were assessed and the results are presented in Table1.

Table1: Mode of Consumption of Millets Among Young Adults from Rajasthan and Uttar Pradesh

Sl. No.	Mode of Consumption	Rajasthan	Uttar Pradesh	Total
1.	*Chapati/Roti*	76.59	72.01	74.30
2.	Breakfast Porridge	35.41	41.79	38.60
3.	Ready to eat	15.81	17.79	16.80
4.	Ready to cook	18.93	20.67	19.80
5.	Drink	8.43	5.37	6.90
6.	Sweets/Desserts	17.66	17.94	17.80

There wasn't much variety in terms of mode of consumption of millets for the study participants. Nearly three quarters of the participants (Table 1) ate millets in form of chapati/roti. Second most common recipe of millets was reported to be breakfast porridge (38.60 %). There was statistical difference among the results for Rajasthan (chapati/roti- 76.59%, breakfast porridge- 35.41%) and Uttar Pradesh (*chapati/roti*- 72.01%, breakfast porridge- 41.79%). 'Ready to eat' (16.80 %), 'ready to cook' (19.80 %) and 'sweets and desserts' (17.80 %) were the categories that reported similar percentages in terms of mode of consumption. Numerous studies have been conducted to assess the acceptability of millets-based recipes among various age groups. In a study conducted to evaluate the potential use of millets in mid-day meal school programmes of peri-urban region of Karnataka (Anitha et al., 2019), the sensory evaluation results showed high acceptability of finger millet idli, pearl millet *bisi bele bath* and little millet *upma*.

Reasons behind Millet Consumption

The respondents were enquired about their major reasons behind consumption of millets and the results are presented in Table 2.

Table 2: Reasons behind Consumption of Millets among Young adults from Rajasthan and Uttar Pradesh

Sl. No.	Reasons behind Consumption of Millets	Rajasthan	Uttar Pradesh	Total
1.	Taste	41.35**	33.85	37.60
2.	Easy availability	29.53***	14.07	21.80
3.	Health Benefits	84.09	88.11	86.10
4.	Inexpensive	15.49	14.31	14.90
5.	Disease conditions	13.38**	8.42	10.90
6.	Weight Loss	12.03	9.77	10.90

****p<0.01; **p<0.05*

Majority of the participants consumed millets (Table 2) for its health benefits (86.10 %) and taste (37.60 %). However, looking at the low frequency of millets consumption (as mentioned earlier), these reasons doesn't seem to be strong enough to be translated into extensive consumption of millets. Conversely, these results can be used to target the younger adults into motivating them towards higher consumption of millets. These results provide an insight into what aspects of millets make sense to the younger adults while considering millets consumption. Other aspects like 'easy availability' (21.80 %) and 'inexpensive nature of millets' (14.90 %) were the lesser dominant reasons behind millets consumption among young adults. 'Disease condition' (10.90 %) and 'weight loss' (10.90 %) were the least popular reasons behind millets consumption, which could be attributed to their young age.

State-wise Differences

In terms of state- wise data, 'easy availability' was a bigger and statistically significant reason

for participants from Rajasthan (29.53 %) (z=3.64; p<0.01) than in Uttar Pradesh (14.07 %) for consuming millets. 'Consumption of millets for its health benefits' was a similarly dominant reason for respondents from both Rajasthan (84.09 %) and Uttar Pradesh (88.11 %). Another statistically significant reason for consuming millets between Rajasthan and Uttar Pradesh was found to be 'taste' (z=2.36; p<0.05) and 'eating due to a disease condition' (z=1.97; p<0.05). Numerous studies (Syah and Yuliati, 2017; Nandi et al., 2016) have reported similar results wherein health related factors were the most prominent reasons behind selection and purchase of healthy foods and organic food products, thus concluding consumer motives, purchase preferences and attitudes.

Reasons for Not Consuming Millets

The respondents were enquired about their major reasons behind non-consumption of millets and the results are presented in Table 3.

Table 3: Reasons behind Non-consumption of Millets among Young adults from Rajasthan and Uttar Pradesh

Sl.No.	Reasons behind Non-consumption of millets	Rajasthan	Uttar Pradesh	Total
1.	Not aware about health benefits of millets	12.75	20.85**	16.80
2.	Lack of availability of millets	20.29	21.31	20.80
3.	Longer cooking time	34.59	34.81	34.70
4.	Need for extra processing	18.51	34.89***	26.70
5.	Peculiar taste	15.87	21.73	18.80
6.	Not part of usual family meals	33.31	43.89**	38.60

****p<0.01; **p<0.05*

Looking at the low frequency of millets consumption among the masses (Kane-Potaka and Kumar, 2019), it is imperative to explore the reasons behind it. The study participants were asked about the reasons for not including millets (table 3) into their diet and reasons like, 'long cooking time' (34.70%), 'need for extra processing' (26.70 %), 'millets not being part of the usual family meals' (38.60 %) were the most common reasons reported. Other reasons like 'peculiar taste' (18.80 %) and 'not aware about health benefits of millets' (16.80 %) were the least common reasons behind non-consumption of millets.

There were minor differences between Rajasthan and Uttar Pradesh based participants. 'Need for extra processing' was more dominant reason for participants in Uttar Pradesh (34.89 %) (z=5.41; p<0.01) than in Rajasthan (18.51 %) for not consuming millets. 'Lack of awareness about health benefits of millets' (z=3.87; p<0.05) and 'millets not being part of usual family meals' (z=4.12; p<0.05) were also the significantly stronger reasons for Uttar Pradesh residents than Rajasthan. Differences among the states for rest of the reasons were not found to be statistically significant. Kane-Potaka et al. (2021) reported that even though millets are easy to be included in the daily diet along with other cereals, the biggest reason behind low consumption of

this crop was the lack of knowledge on ways to include them in existing dietary patterns and correct knowledge about cooking millets.

CONCLUSION

The present study concludes that the awareness of millets and its types among young adults is low. Millets were not found to be consumed by the respondents in form of a variety of recipes, with the usual few preparations like chapati/roti and porridges being most common ways of consumption. Factors like millets taking long time to cook and its need for extra processing are the reasons behind low consumption. However, family can play a big role in inclusion of millets in the consciousness and daily diets of the younger generations. There were differences in the reasons for consuming and non-consumption of millets among the residents of Rajasthan and Uttar Pradesh, however, the two states demonstrated numerous similarities in terms of awareness and use of millets. This shows that similar strategies focussed on millets can work in these two states. The findings of this study present basis for formulating interventions of mainstreaming millets. The study suggests that awareness about the most common and regional millets along with their health benefits should be ensured among the youth. The results of this study could be beneficial for policymakers and various stakeholders, such as food companies, government agencies, nutritionists, development organizations, and researchers, who aim to increase millet consumption through government initiatives by enhancing awareness and launching marketing campaigns. It is essential to identify specific consumer groups based on the research findings, as understanding consumer awareness and their reasons for choosing or avoiding millets could offer valuable contributions to public health discussions. This information is particularly relevant for the Government of India Millet Mission and state-level Millet Missions. Additionally, it may aid in the development of nutrition behavioural change programmes in urban environments.

REFERENCES

Abuhashesh MY, Al-Dmour H, Masa'deh R, Salman A, Al-Dmour R, Boguszewicz-Kreft M & AlAmaireh QN. (2021). The Role of social media in Raising Public Health Awareness during the Pandemic COVID-19: An International Comparative study. *Informatics*. *8*(4):80. https://doi.org/10.3390/informatics8040080

Anitha, S., Kane-Potaka, J., Tsusaka, T.W., Tripathi, D., Upadhyay, S., Kavishwar, A., Jalagam, A., Sharma, N. & Nedumaran, S. 2019. Acceptance and Impact of Millet-Based Mid-Day Meal on the Nutritional Status of Adolescent School Going Children in a Peri Urban Region of Karnataka State in India. *Nutrients*. *11*(9):2077. doi: 10.3390/nu11092077.

Basavaraj, G., Parthasarathy Rao, P., Bhagavatula, S., & Ahmed, W. (2010). Availability and utilization of pearl millet in India. *Journal of SAT Agricultural Research*. 8, 1–7.

Chakraborti, R., Davis, K.F., DeFries, R. et al. (2023). Crop switching for water sustainability in India's food bowl yields co-benefits for food security and farmers' profits. *Nature Water*, 1, 864–878. https://doi.org/10.1038/s44221-023-00135-z

Duralia, O. (2023). Food Consumption Behaviour-Influencing Factors and Trends. *Studies in Business and Economics*. *18*. 109-123. 10.2478/sbe-2023-0027.

Ghosh, K., Vinodkumar, T., Singh, R. et al. (2024). Promising potential of millets as the staple of our plate: an Indian perspective. *Discover*

Food 4, 103. https://doi.org/10.1007/s44187-024-00176-7

Jaiswal, N., Kammara, M., Nishad, T., Khan, A. & Jatav, D. (2023). Revitalizing Agriculture Extension Services for Millets: A Comprehensive Review of Strategies, Challenges, and Innovations. *International Journal of Plant & Soil Science*. *35*. 307-315. 10.9734/ijpss/2023/v35i234245.

Jalal, P., & Pandey, A. (2024). Exploring the Consumption Pattern of Millets among Rural Women of Udham Singh Nagar District of Uttarakhand, India. *Asian Journal of Current Research*, *9*(4), 1–6. https://doi.org/10.56557/ajocr/2024/v9i48835

Kane-Potaka, J., & Kumar, P. (2019). "Smart food - food that is good for you, the planet and the farmer," in *State of India's Livelihoods Report 2019* (New Delhi: Access Development Services), 71–82. https://livelihoods-india.org/publications/all-page-soil-report.html#; www.smartfood.org/wp-content/uploads/2020/05/SOIL-Smart-Foods.pdf

Kane-Potaka, J., Anitha, S., Tsusaka,T.W., Botha, R., Budumuru, M., Upadhyay, S., Kumar, P., Mallesh, K., Hunasgi, R., Jalagam, A.K. & Nedumaran, S. (2021). Assessing Millets and Sorghum Consumption Behavior in Urban India: A Large-Scale Survey. *Frontiers in Sustainable Food Systems*, *5*:680777. doi: 10.3389/fsufs.2021.680777

Katiyar, D. (2024). *Assessing Knowledge, Perception, Awareness And consumption behavior of millets in Uttar Pradesh* . Unpublished M.Sc. Thesis, Department of Agricultural Extension, College of Agriculture Banda University of Agriculture and Technology , Uttar Pradesh (India)]

Mediratta, S. & Mathur, P. (2023). Determinants of Food Choices among Adults (20–40 Years Old) Residing in Delhi, India. *Current Developments in Nutrition* .*7*(2). https://doi.org/10.1016/j.cdnut.2023.100029.

Nandi, R., Bokelmann, W., Gowdru, N. V., & Dias, G. (2016). Consumer motives and purchase preferences for organic food products: empirical evidence from a consumer survey in Bangalore, South India. *Journal of International Food & Agribusiness Marketing*., *28*, 74–99, doi: 10.1080/08974438.2015.1035470

Parthasarathy Rao, P., Basavaraj, G., Ahmad, W., & Bhagavatula, S. (2010). An analysis of availability and utilization of sorghum grain in India. *Journal of SAT Agricultural Research 8*, 1–9.

Syah, A., & Yuliati, L. N. (2017). The influence of values and attitude toward healthy food selection at student of Bogor Agricultural University. *Journal of Consumer Science* ,2, 57–65. doi: 10.29244/jcs.2.2.57-65

Umanath, M., Balasubramaniam, R., & Paramasivam, R. (2018). Millets consumption probability and demand in India an application of heckman sample selection model. *Economic Affairs*, *63*, 1033–1044. doi: 10.30954/0424-2513.4.2018.29.

Vetriventhan, M., Azevedo, V. C. R., Upadhyaya, H. D., Kane-Potaka, J., Anitha, S., Prabhakar Govindaraj, M., et al. (2020). Genetic and genomic resources, and breeding for accelerating improvement of small millets: current status and future interventions. *Nucleus 63*, 217–239. doi: 10.1007/s13237-020-00322-3.

Willett W. (2013) *Nutritional Epidemiology*. 3rd ed. Volume 40 Oxford University Press; New York, NY, USA.