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Organic Product Awareness and Healthy Life Preferences of Iğdır University Students: Investigation with Machine Learning and AHP Analysis

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Abstract
The aim of this study is to analyze the demographic structure, knowledge level about organic products and healthy lifestyle preferences of students of Iğdır University. In the study, a face-to-face survey was conducted on 300 students. RStudio program was used to analyze the data and machine learning method with XGBoost algorithm was preferred. The participants of the survey were 53.7 % male and 46.3 % female. Most of the participants are in the age group of 21-22 years (32.7 %) and are students in formal education (85.3 %). It was observed that the higher the number of siblings, the lower the level of education. There is a positive correlation between family income and educational level. The factors that most influence the knowledge of organic products are the number of siblings, fast food diet and family income. As family income increases, so does awareness of organic products. The majority of participants correctly define organic products. AHP analysis revealed that being physically healthy in the future is more important than being physically healthy now. The relationship between organic products and physical health stands out as an important result. The Friedman test confirms that the AHP analysis has produced a successful result with a high degree of accuracy.

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1. Introduction

The global population growth has led to an increase in agricultural production, which in turn triggered the so-called 'green revolution' between the 1940s and 70s (Teksöz, 2016). However, the widespread use of conventional agricultural practices and the unconscious use of chemical fertilizers and pesticides during this period had negative impacts on the environment and human health (Özalp et al., 2017). This situation has disrupted the natural balance and increased health hazards. As a result, there has been a growing interest in environmentally friendly and healthy agricultural practices, such as organic farming.

Organic agriculture emerged in the 1970s as a response to growing environmental awareness and demand for healthy products. The International Federation of Organic Agriculture Movements (IFOAM) was established in Germany in 1972, further fueling the movement (Eyiler, 2014). Today, organic agriculture refers to products that are controlled and certified to protect human and environmental health throughout the entire process, from seed to harvest and from harvest to the end user (Lotter, 2003).

Interest in healthy nutrition has increased, especially during the Covid-19 pandemic (Dilber and Dilber, 2020; Macit, 2020). Organic foods are preferred due to their hygienic and reliable nature. However, no comprehensive research has been conducted on Iğdır University students' knowledge of organic products and healthy nutrition. Therefore, this study aims to determine students' awareness of organic products and their perspectives on healthy nutrition.

Iğdır is a province located in Turkey's Eastern Anatolia Region. It is bordered by three countries: Armenia, the Nakhchivan Autonomous Republic of Azerbaijan, and Iran. The province has a rich cultural heritage (Eyduran et al., 2015). Additionally, a large portion of Mount Ararat, Turkey's highest mountain, is located within the borders of Iğdır. Iğdır's economy is based on agriculture and animal husbandry. The region produces various agricultural products and engages in live animal trade.

Iğdır University, a state university established in 2008.The university offers a wide range of academic programs, including undergraduate, graduate, and doctoral programs. Iğdır University aims to contribute to the development of the region through its modern campus, experienced teaching staff, and rich social facilities.

The university has around 14.000 active students and over 800 staff members. It offers educational services through 15 faculties and vocational schools, 23 research centers, and 69 student societies, creating a rich academic and social environment. The university offers students the chance to pursue their education on a contemporary campus with a diverse range of programs and knowledgeable faculty. Furthermore, the institution has produced approximately 17.000 alumni to date, empowering them to contribute to both regional and national development.

Iğdır University specializes in the field of High Value-Added Agricultural Products and places great importance on education and research activities in this area. The university welcomes international students and fosters a diverse cultural and academic environment.

It is crucial for university students to have a strong understanding of organic knowledge, particularly in relation to organic food consumption and healthy lifestyle choices. Research has shown that students' consumption of organic food is influenced by various factors, including their level of knowledge. A study conducted in Isparta province found that university students' consumption of organic food was significantly affected by their level of knowledge (Sarica et al., 2023).

In this context, students' sufficient knowledge about organic foods may help them develop healthy eating habits and consume consciously, considering environmental concerns. Additionally, it was observed that students with higher probiotic knowledge consumed more probiotic foods, indicating

that knowledge level may affect consumption preferences. Therefore, the knowledge level of organic foods for university students is an important factor for both individual health and a sustainable environment.

2. Materials and Methods

2.1. Collection of survey data

This study's primary data was collected from undergraduate and associate degree students enrolled in faculties affiliated with Iğdır University during the 2022-2023 academic year. The data was collected through interviews using a survey designed for the study's purpose. The study's secondary data was obtained from the Iğdır University rectorate student affairs department and student affairs services of faculties. The study's sample size was determined using the Proportional Sampling Method. For a finite population, the sample size is determined based on the known or estimated proportion of individuals with a certain characteristic. The value of p can be obtained from previous studies or estimated intuitively. To achieve the maximum sample size, p = 0.5 should be used. Values of p lower or higher than 0.5 will result in a smaller sample size. Therefore, when p is unknown, it is recommended to use p = 0.5 as this will result in the maximum sample size and reduce the potential error (Newbold et al., 2012).

$$n = \frac{Np(1-p)}{(N-1)\sigma_{\bar{p}_x}^2 + p(1-p)} \quad (1)$$

Where; n is the sample size, N is the number of students of Iğdır University, p is the variance of apricot producers in the population (0.5 for maximum sample volume) and σ_p is the variance of the x^2 ratio. In the research, it was aimed to reach the largest possible sample volume and for this purpose, p: 0.50 and (1 - p): 0.50 were taken. With the proportional sampling method, the number of students to be surveyed was determined as 251 with a 90 % confidence interval and a 5 % margin of error. In addition, at least 15 % replacement surveys were conducted in case of a possible erroneous survey. However, as the survey was conducted with university students who volunteered to participate, the number of in-study participants was greater than that of the original sample size. Following the a priori control measures, it was determined that 300 questionnaires were suitable for machine learning and AHP analysis. Consequently, the study was shaped accordingly.

2.2. Machine learning analysis

The evaluation phase of the survey studies utilized a machine learning method (Cordoni et al., 2021; Gono et al., 2023). The free and open-source software, RStudio, was used for the machine learning process. The XGBoost algorithm was employed in the machine learning model to analyze the organic product knowledge levels of Iğdır University students by examining the demographic structure. The analysis examined the nutritional preferences of Iğdır University students based on their demographic structure.

During the training phase of the XGBoost machine learning model, specific parameters are utilized. This process, known as hyperparameter optimization, involves defining ranges for the values of seven distinct parameters and generating combinations for these optimizations. The parameters used in the training process include nrounds, booster, max_depth, eta, nthread, gamma, colsample_bytree, min_child_weight, and subsample. Sequentially, decision trees for classification and regression (known as Classification and Regression Trees or CART) are created. Each tree in the model is trained using the residuals of the previous tree. Each new tree aims to predict outcomes while correcting errors made by the previously trained tree (Cordoni et al., 2021; Gono et al., 2023).

$$Y_i = F(X_i) = \sum_{d=1}^{D} f_d(X_i), f_d \in F, i = 1, \ldots, n \quad (2)$$

F represents the function space of CART models, with each fd corresponding to an independent CART structure denoted as q. In other words, q is the set of rules of an independent CART that classifies each into a single leaf. The correlation between actual and predicted values is then calculated. Correlation analysis within XGBoost machine learning was also used to determine the relationship between variables. Correlation is a statistical measure that ranges from -1 to 1. A value of 1 indicates perfect positive correlation, while a value of -1 indicates perfect negative correlation (Huang et al., 2017; Cordoni et al., 2021).

2.3. Analytic hierarchy process (AHP)

The process involves making a choice among options to achieve goals and objectives (Forman and Selly, 2001). AHP is a decision-making method developed by Thomas L. Saaty in 1980 (Bernasconi et al., 2010). It is used to solve complex problems involving multiple criteria. It allows decision makers to model complex problems in a hierarchical structure that shows the relationship between the main objective, criteria, sub-criteria, and options (Bernasconi et al., 2010). The method helps to structure and analyze decision problems by breaking down the complex problem in a hierarchic order and by employing pair-wise comparisons of its elements to determine the preferences among the set of alternatives (Çiftçi at al., 2013). The study utilized the Analytic Hierarchy Process (AHP) method to analyze the dietary sensitivity of Iğdır University students and their preferences for future health. The statistical data obtained from this method were used to model the best nutrition and health designs for students in the future.

3. Results and Discussion

3.1. Demographic structure analysis of Igdir University students

The survey conducted a demographic analysis of university students, including age, gender, number of siblings, and education types. The data collected was organized into groups and presented in Table 1. Interpreting the data from Table 1 academically allows for analysis of the effects of students' demographic characteristics on their education and social life. Among the age groups, the number of students in formal education is higher than those in secondary education for the 21 and 22-24 age groups. This may indicate a higher interest in full-time education among younger age groups. In contrast, for the age group of 25 and above, the number of students in both types of education decreases. This suggests that the probability of continuing full-time education decreases with increasing age.

When analyzing the data based on the students' education type, it can be assumed that second education students are generally more likely to balance work and education. Work and family responsibilities may be factors affecting students' educational preferences. The number of married students is low, indicating that marriage is less common among university students and the majority are single.

Table 1. Demographic structure analysis of Igdir University students

Age group	Education type	Gender	Marital status	Number of siblings	Number of people
Less than 17	Formal Education	Female	Single	between 6-9	1
18-21 Ages	Secondary Education	Male	Single	between 0-2	2
				10 and above	2
				between 3-5	4
				between 6-9	1
			Married	between 6-9	1
		Female	Single	10 and above	2
				between 3-5	2
				between 6-9	5
	Formal Education	Male	Single	between 0-2	5
				10 and above	2
				between 3-5	26
				between 6-9	12
		Female	Single	between 0-2	3
				10 and above	4
				between 3-5	27
				between 6-9	21
			Married	between 3-5	1
22-24 Ages	Secondary Education	Male	Single	between 3-5	8
				between 6-9	3
		Female	Single	10 and above	1
				between 3-5	6
				between 6-9	8
	Formal Education	Male	Single	between 0-2	4
				10 and above	3
				between 3-5	43
				between 6-9	31
			Married	between 3-5	2
		Female	Single	between 0-2	1
				10 and above	1
				between 3-5	22
				between 6-9	26
25 and above	Secondary Education	Male	Single	between 3-5	1
				between 6-9	1
		Female	Single	between 3-5	1
				between 6-9	1
	Formal	Male	Single	between 0-2	4
				between 3-5	3
		Female	Single	between 0-2	1
				10 and above	1
				between 3-5	6
				between 6-9	1
Total					**300**

Results of the analysis by number of siblings show that the number of students with 0-2 siblings is generally higher than other sibling groups. This suggests that small family size may have a positive impact on educational access and attendance.

The analyses conducted in this project may also be important for university administration and policy makers. Designing educational programs and support services that consider student demographics can enhance student success and satisfaction. Additionally, demographic data can aid in planning social and cultural activities at the university. This is particularly important for Igdir University, which is still developing since its establishment.

3.2. Organic product knowledge level analysis of Iğdır University students

The study utilized the XGBoost machine learning method to obtain unbiased and accurate interpretations of the survey data. A machine learning model was established using 14 demographic variables from the survey, which included a question on awareness of organic products. The importance parameters of the model are presented in Table 2.

Table 2. Importance ranking of variables according to the Machine Learning model

No	Feature	Gain	Cover	Frequency
1	Number of siblings	0.19	0.20	0.17
2	Fast-Food nutrition	0.11	0.10	0.10
3	Family income	0.10	0.10	0.10
4	Regular meals at restaurants and cafes on or off campus	0.08	0.06	0.07
5	Regular meals at the university cafeteria (or dormitory canteen)	0.07	0.07	0.07
6	Mother's education level	0.06	0.05	0.06
7	Father's education level	0.06	0.08	0.08
8	Age	0.06	0.06	0.06
9	The place of childhood	0.06	0.07	0.07
10	Regular meals at home	0.05	0.06	0.07
11	Gender	0.05	0.04	0.04
12	Place of completion of high school education	0.04	0.04	0.04
13	Monthly allowance	0.03	0.04	0.04
14	Mode of study	0.03	0.03	0.03

Table 2 displays the feature importance table, which indicates the features of a machine learning model that have the most influence on the outcome. The 'Gain', 'Cover', and 'Frequency' values for each feature are metrics that show how effective they are in the model's predictions. 'Gain' indicates how much a feature improves the model's predictions. A high 'Gain' value means that the model considers this feature more in the decision-making process. 'Cover' This text describes how to interpret the 'Cover' and 'Frequency' values of a feature in a dataset. A high 'Cover' value indicates that the feature affects more data points and plays an important role in the overall structure of the model. A high 'Frequency' value indicates that the feature is frequently used by the model to make decisions.

Based on the data presented in Table 2, it is evident that the number of siblings has a significant impact on organic product knowledge. The second most important factor in the model ranking is the consumption of fast-food. The results indicate that as the number of siblings increases, organic product awareness decreases. It can be predicted that with an increase in the number of siblings, the awareness of organic products will decrease. According to the machine learning analysis, family income was found to be the third most significant factor affecting organic product awareness. However, low family income was found to have a negative impact on organic product awareness. The machine learning model identified variables with Gain values below 0.1 as insignificant. Thus, the study identified the number of siblings, fast-food eating habits, and family income level as the three most significant factors affecting the awareness of organic products among Iğdır University students.

To ensure the reliability of the results obtained from the machine learning model, hyperparameter tuning was performed first using the XGboost algorithm. In this process, we tried different combinations of 7 parameters and determined the optimal hyperparameter settings.

Table 3. Best hyperparameter values for the XGBoost machine learning model

Nrounds	Max_depth	Eta	Gamma	Colsample_bytree	Min_child_weight	Subsample
1000	3	0.01	0	0.6	3	0.8

Table 3 provides information on the parameters used in the model. Nrounds refers to the number of boosting iterations, which determines the number of rounds the model will be trained. Nrounds refers to the number of boosting iterations, which determines the number of rounds the model will be trained. Max_depth is the maximum depth of the tree, which can increase the model's complexity and the risk of overfitting. Eta is the learning rate, which determines the amount by which the trees 'shrink' their weights at each step. Gamma determines the minimum loss reduction required for the tree to grow, with larger values making the model more conservative. Colsample_bytree determines the proportion of columns used when creating the subset of observations for each tree. Min_child_weight is the minimum weight required for further splitting of a node, and it is used to check for overfitting. Subsample is the proportion used when creating the subset of observations in each iteration. The optimal values for model training are determined by the tuning combinations of these parameters, resulting in the model achieving the optimal prediction.

The success of the predictions is measured by three different values, including the Root Mean Square Error (RMSE), which is the square root of the average of the squares of the differences between the actual and predicted values. The RMSE measures the accuracy of the model's predictions and gives more weight to large errors. Mean Absolute Error (MAE) is the average of the absolute errors between the actual and predicted values. It gives equal weight to all errors when measuring the model's performance. The R-squared (R^2) value is a statistical measure of how close the data are to the fitted regression line. It indicates how well the model explains the variance between the independent and dependent variables, with a value ranging from 0 to 1. The closer it is to 1, the better the fit of the model.

The machine learning model was evaluated using RMSE, MAE, and R^2 values. The results showed an RMSE value of 1.035261, an MAE value of 0.9821299, and an R^2 value of 0.725. No changes were made to the content of the original text.

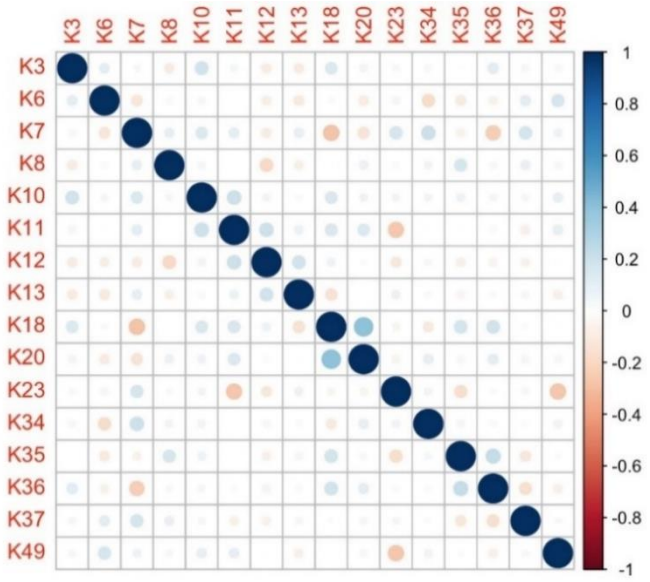

Figure 1. Correlation matrix between dependent and independent variables.

Although machine learning ranks the importance of variables and explains them with numerical data, it does not provide a clear indication of whether the relationship between variables is positive or negative. Therefore, correlations between variables were also examined at the end of the machine learning process. Figure 1 shows the results for organic product awareness (K49), number of siblings (K23), fast food consumption (K34), and family income (K18). Since the other K variables are not significant for the model, they are not evaluated in this section. However, the K values generally correspond to the survey questions, which can be found at the end of the report.

Although K49 does not exhibit a clear correlation with K34 and K18 based on normal correlation values, it does reveal that the most significant indicator, K23 (i.e., the change in the number of siblings), has a negative correlation with K49. This situation highlights the impact of the number of siblings, as explained in the machine learning model, on organic product awareness. The second most common diet type in the model is fast food. According to the model, the awareness of organic products decreases as the number of siblings increases. The awareness of organic products is predicted to decrease with an increase in the number of siblings. Unfortunately, low family income has a negative impact on the awareness of organic products.

During another stage of the project study, participants were asked to define organic products. Table 4 presents the frequency and percentage values of the four different answers provided by the participants in the survey.

Table 4. Iğdır University students' definitions of organic products

Answers	Frequency	Percentage
1) High yield crops.	88	29.33
2) The use of artificial fertilizers and pesticides is intensive.	8	2.67
3) Green manures such as animal manure and plant residues are used and cultural and biological methods other than pesticides are used to control diseases.	202	67.33
4) Damages soil, air and water	2	0.67
Total	300	100

Table 4 shows that the first definition, which includes the term 'high yielding crops', represents about 29.33 % of the total responses. The second definition, which emphasizes 'intensive use of artificial fertilizers and pesticides', represents approximately 2.67 % of the responses. The third definition provides a more detailed description of organic farming practices. Organic farming utilizes green fertilizers like animal manure and plant residues, and prefers cultural and biological methods over pesticides to control diseases. This definition accounts for the majority of responses, approximately 67.33 %. The fourth definition, which includes the statement that it damages soil, air, and water, represents only a very small proportion, about 0.67 %. In conclusion, most participants correctly identified the definition of organic products, with the third definition being the correct one. This indicates that the majority of Iğdır University students are aware of organic farming as a natural and sustainable agricultural practice.

2.3. AHP analysis for Iğdır University students

Tables 5 and 6 present the statistical results of the Analytic Hierarchy Process (AHP) applied to the data obtained from surveys administered to students at Iğdır University. The AHP analysis is a mathematical method used to evaluate different alternatives and criteria in decision-making processes. One table displays statistical values, while the other shows the AHP scores of the alternatives.

Table 5. AHP analysis statistical data

	Mean	Median	St. Dev.	Min	Max
Organic product	0.251	0.231	0.128	0.032	0.574
Consuming dietary product groups	0.207	0.195	0.087	0.040	0.499
Sport/walking/dance	0.189	0.171	0.093	0.020	0.501
Reading books and various mental activities	0.169	0.168	0.069	0.028	0.472
Working at a job	0.184	0.165	0.113	0.014	0.544

Table 6. AHP analysis results

	Organic product	Consuming dietary product groups	Sport Walking Dance	Reading books and various mental activities	Working at a job
Being physically healthy right now	0.29	0.13	0.16	0.23	0.18
Being physically healthy in the future	0.23	0.22	0.20	0.16	0.18

Table 5 presents the statistical characteristics of a set of alternatives, while Table 6 displays the AHP (Analytic Hierarchy Process) scores of these alternatives in terms of specific criteria. Upon closer evaluation of the results, it is evident that Organic Product has higher mean and median values than the other alternatives, indicating a preference for organic products among participants. The standard deviation is low, indicating consistent attitudes towards organic products among the participants.

The mean and median values for consuming dietary product groups are at an average level, with a balanced preference for diet products in general. For sport, jogging, and dance, the mean and median values are lower than the other alternatives, but the standard deviation is higher. The statement suggests that participants' preference for physical activities, such as sports, walking, and dance, varies significantly.

Reading books and engaging in mental activities are generally less preferred alternatives, but there is a broad consensus among the participants on this issue. In terms of work, the mean and median values are moderate compared to the other alternatives, but the maximum value is higher than the others. The data suggests that certain participants prioritize work over other activities.

Table 6 evaluation shows that 'Organic Products' received the highest score for the criterion of being physically healthy right now, while other activities received lower scores. This indicates a preference for organic products over other alternatives in terms of physical health. In the Future Physical Health Criterion, Organic Products and Dietary Product Groups received the highest scores, indicating a preference among participants for these types of products to maintain their future physical health. These comments provide insight into the relationship between health and activity preferences by evaluating participants' preferences. The correlation between organic products and physical health is a significant result. However, personal preferences and lifestyles can also impact these choices. Therefore, it is crucial to consider these factors when developing health policies and public health strategies.

Table 7. Statistical data for alternatives

	Mean	Median	St. Dev.	Min	Max
Being physically healthy right now	0.29	0.17	0.256	0.1	0.9
Being physically healthy in the future	0.71	0.83	0.256	0.1	0.9

Table 7 displays the statistical significance of the criteria 'being physically healthy now' and 'being physically healthy in the future' within the Analytic Hierarchy Process (AHP). The values in the table represent the following: Mean, the average level of importance for each criterion. Median, the degree of importance at the midpoint of the criteria. Standard Deviation (St.dev.), this section displays the distribution of importance ratings. The criteria can receive a minimum (Min) and maximum (Max) importance rating.

The mean and median values indicate that 'being physically healthy in the future' is considered more important than 'being physically healthy now' by the participants. As the standard deviation is the same for both cases, the distribution of participants' opinions is similar. Additionally, the minimum and maximum values fall within the same range for both criteria.

A Friedman test was conducted to test the accuracy of the AHP analysis results. The test revealed a statistically significant difference in the importance levels of the criteria for 2 different criteria and 5 different variables, rather than a random variation. This type of analysis is crucial in decision-making processes that involve choosing among multiple alternatives. The values obtained from the Friedman test show a highly statistically significant result, with a p-value of 2.03253^{-25}. This suggests that the probability of random variation between the compared criteria is very low. The alpha value of 0.01 indicates a statistically significant difference between the criteria at a 1% alpha level. The Friedman test confirmed that the AHP analysis yielded a successful result with a high degree of accuracy.

When examining research on determining university students' perspectives on healthy nutrition and organic product awareness, many studies were found in the literature. The research conducted on organic products has focused on material considerations. The results indicate that young individuals, who mostly have low-income levels, are the most affected by high prices when it comes to consuming organic products. In other words, young participants found organic products to be expensive. In studies similar to ours, data were mostly collected through face-to-face surveys (Çiftçi at al., 2013; Bahşi et al., 2019; Akgül et al., 2020; Ayaşan et al., 2021).

The studies primarily utilized descriptive statistics and sampling methods for analysis. Additionally, regression and SWOT analyses were conducted, revealing weak organic nutrition habits among the students (Toplu Yılmaz and Demirbaş, 2021; Sarica et al., 2023). Additionally, the study analyzed the general factors that could trigger these situations. It was also observed that there are discrepancies between consumer demand for ecological food products and the supply provided by companies. This indicates a shortage of eco-products in the market, with demand exceeding supply (Toplu Yılmaz and Demirbaş, 2021; Sarica et al., 2023).

Research has analyzed the factors leading to obesity and the dietary preferences of university students using the AHP method (Erdem Haciköylü, 2006; Bolayır et al., 2023). The most significant factors were dietary habits (29.9 %) and physical activity (22.7 %).

Students prioritized easily prepared and time-saving food products, and out-of-home and fast-food options were popular. There were no significant differences found between eating habits and demographic factors. However, differences were observed in BMI, adequate nutrition, and reasons for skipping meals. Male students were found to have higher levels of physical activity than female students. When it comes to fast-food restaurant

preferences, cleanliness, taste, and staff attitude were determined to be important factors. The main reasons affecting fast-food consumption were product features, speed, and price policy. The study found that physical factors and the image of the establishment were deemed less significant. It is emphasized that the Analytic Hierarchy Process (AHP) is an effective tool for conducting complex analyses (Bolayır et al., 2023).

Although the project results are similar to those found in the literature, the analysis of the demographic structure reveals that the student profile at Iğdır University differs from those in previous studies. The analysis includes grouping students based on factors such as age, education type, marital status, and number of siblings. This analysis is crucial for comprehending students' educational preferences and social lives. For instance, the results indicating a high interest in full-time education among younger age groups and a decreasing likelihood of continuing full-time education as age increases can provide valuable insights in shaping educational policies.

The analysis of organic product knowledge level was conducted using the XGBoost machine learning method. This analysis aims to determine students' level of knowledge about organic products and the factors affecting it. The study revealed that certain factors, such as the number of siblings, fast-food eating habits, and family income, have a significant impact on organic product awareness.

Specifically, low family income and increased fast-food consumption were found to have a negative effect on organic product awareness. These results are consistent with previous research. In 2012, Longacre et al. revealed a correlation between low-income levels and fast-food consumption, particularly in non-metropolitan areas such as Iğdır province (Longacre et al., 2012). Similarly, analogous relationships have been identified in other studies in the literature (Block et al., 2004; Akbay et al., 2007).

AHP analysis was utilized to evaluate the health and activity preferences of students. The results indicated a preference for organic products over other alternatives, particularly for physical health. Additionally, organic products and dietary product groups were favored for future health concerns. These results can serve as a guide for promoting organic products and healthy lifestyles in the development of health policies and public health strategies.

In conclusion, these analyses provide insight into the demographic structure, organic product knowledge levels, and health preferences of Iğdır University students. This information can be used by the university administration, policy makers, and health experts to better respond to the educational and health needs of students.

4. Conclusion

This study provides a thorough examination of the demographic characteristics, organic product knowledge levels, and health-related preferences of students at Iğdır University. The analysis of the demographic structure revealed that factors such as age, level of education, marital status, and number of siblings significantly influence students' educational preferences and social lives. The interest in full-time education, particularly among younger age groups, and the decreasing likelihood of continuing full-time education as they age provide important insights for shaping education policies. An analysis of organic product knowledge levels was conducted using the XGBoost machine learning method. This analysis revealed that factors such as the number of siblings, fast-food eating habits, and family income have significant effects on organic product awareness. Low family income and increased fast-food consumption were found to negatively affect awareness of organic products. AHP analysis was used to evaluate students' health and activity preferences. The results showed that organic products were preferred over other alternatives, particularly for physical health, and for future health concerns, organic products and dietary product groups were

preferred. These results can guide the promotion of organic products and healthy lifestyles in health policies and public health strategies. University administration, policy makers, and health professionals can consider this information to respond more effectively to the educational and health needs of students. Additionally, demographic data can inform the planning of social and cultural activities at the university. These results are of great importance especially for Iğdır University, which has been developing since its establishment and is still developing. Therefore, the results of this study can make significant contributions to the future development of Iğdır University and student success.

Declaration of Author Contributions

The authors declare that they have contributed equally to the article. All authors declare that they have seen/read and approved the final version of the article ready for publication.

Declaration of Conflicts of Interest

All authors declare that there is no conflict of interest related to this article.

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Ethical Committee Approval

The ethical committee permission for the survey was given by the Scientific Research and Publication Ethics Committee of Iğdır University on 06.04.2023.

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