SCI4001 Science and Society

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Title: The Impact of Education on Food Choice among University Students

Abstract

At a glance, Kyrgyzstan seems like a sustainability paradox. A country where meat consumption is so high, it is part of the culture itself due to nomadic history and pastorial traditions, yet the country maintains low greenhouse gas emissions compared to the global averages [1][2][6]. This research was motivated due to lifelong observations of traditional sustainable practices that is ingrained into the Kyrgyz culture, justifying an investigation. A cross-sectional survey (n=51, October-November 2025) that examined meat consumption, traditional practices, environmental awareness, and knowledge transmission. Results show 65% express environmental concern, 45% are willing to reduce meat consumption [7][11], and traditional practices persist in rural areas with reported 30-40% cost savings [2][6]. However, it is important to mention that this research cannot establish causality between traditional practices and Kyrgyzstan's low emissions, as multiple confounding factors — geographic conditions, economic development, energy infrastructure, and population density—substantially influence national emissions profiles [6][11]. These findings contribute empirical evidence regarding traditional ecological knowledge persistence and suggest pathways for integrating cultural practices into sustainability frameworks aligned with SDG 12, 13, and 15.

Keywords: meat consumption, traditional ecological knowledge, Kyrgyzstan, environmental awareness, knowledge transmission

1. Introduction

1.1 Research Motivation and Context

This research was enabled by the recognition of traditional sustainable practices, which included the making and usage of tezeks (manure fuel) and waste-based livestock feeding, and more practices which are integrated into the daily lives of Kyrgyz citizens [2]. As a Kyrgyz student in Hong Kong, who is minoring in Environmental and Scientific Literacy, the

knowledge of Hong Kong being one of the biggest GHG contributors due to the meat consumptions was shocking. It brought up the question on how Kyrgyzstan, a country whose culture and economy is highly dependent on meat has remained relatively low on that end. Which bring an interesting idea on whether these sustainable practices can be spread globally to help developed nations tackle their own issues with high carbon footprint due to meat consumption. This idea prompted an investigation, which became this project, on these practices to contribute to the global sustainability discourse [2][6].

1.2 Global and Regional Context

Global meat consumption increased 204-500% between 1960-2016 [7]. The livestock sector generates 12-18% of global GHG emissions, with beef production at 23.4-27.2 kg CO_2eq/kg [7][6][11]. Young adults in Kazakhstan consume ~1500g meat weekly—nearly 3x WHO recommendations [1]—yet Kyrgyzstan maintains GHG emissions below global averages [1][2]. This paradox warrants investigation [2].

Traditional practices in Kyrgyzstan represent adaptive strategies developed through centuries of pastoral heritage and nomadic lifestyle.[2]. As in the past, nomadic Kyrgyz people couldn't utilize agriculture due to their moving, and relied heavily on animals for nutrition and transport. This led to their cuisine consisting highly of meat. These practices function as circular economy approaches with reported 30-40% cost savings [2]. Knowledge transmission occurs through observation, hands-on practice, and narrative discussion, though rural-to-urban migration threatens knowledge persistence [2]

1.3 Research Objectives

This research had several aims:

1. To assess meat consumption patterns across Kyrgyz citizens
2. Document their knowledge and awareness on traditional practices
3. Examine their environmental awareness
4. Investigate how traditional knowledge is transmitted
5. Evaluate how viable it is it integrate these practices into other frameworks.

2. Methodology

2.1 Research Design and Sample

A self-designed cross sectional survey assess respondents' meat consumption, sustainable practice knowledge, and knowledge transmission. The survey was administered though Google Forms in Kyrgyz supplemented with Russian (October-November 2025) to 51 respondents (84.6% female, 15.4% male; age range 0-60) from urban and rural areas. Gender imbalance and the small sample size are some of the limitations of this paper that affect generalizability [8].

2.2 Data Collection

The questionnaire had three parts:

(1) Meat Consumption Behavior—10 questions that measured consumption frequency (1-7 scale), meat types, and sources;

(2) Traditional Sustainable Practices—9 questions measuring tezek use, waste feeding, and cost savings;

(3) Environmental Awareness—10 questions measuring concern, reduction willingness, and knowledge transmission pathways.

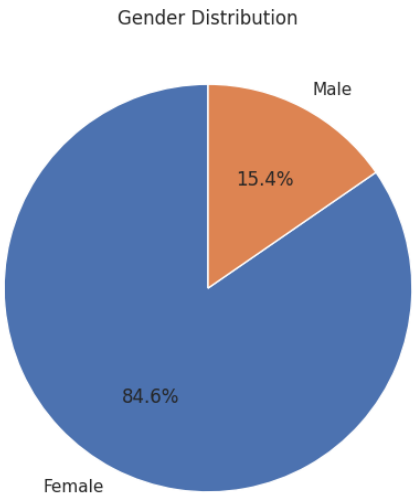
All respondents provided informed consent[1][8].

2.3 Data Analysis

The analysis utilized techniques such as descriptive statistics (frequencies, mean, standard deviations), comparative testing (t-tests, chi-square), correlation analysis, and regression modelling all through Python (numpy, pandas, scipy). Qualitative responses were analyzed thought thematic coding as well [8]. The goal was to create a program through Google Collab and Python that would simultaneously be able to clean the data, process it and provide illustrations in the needed formas.

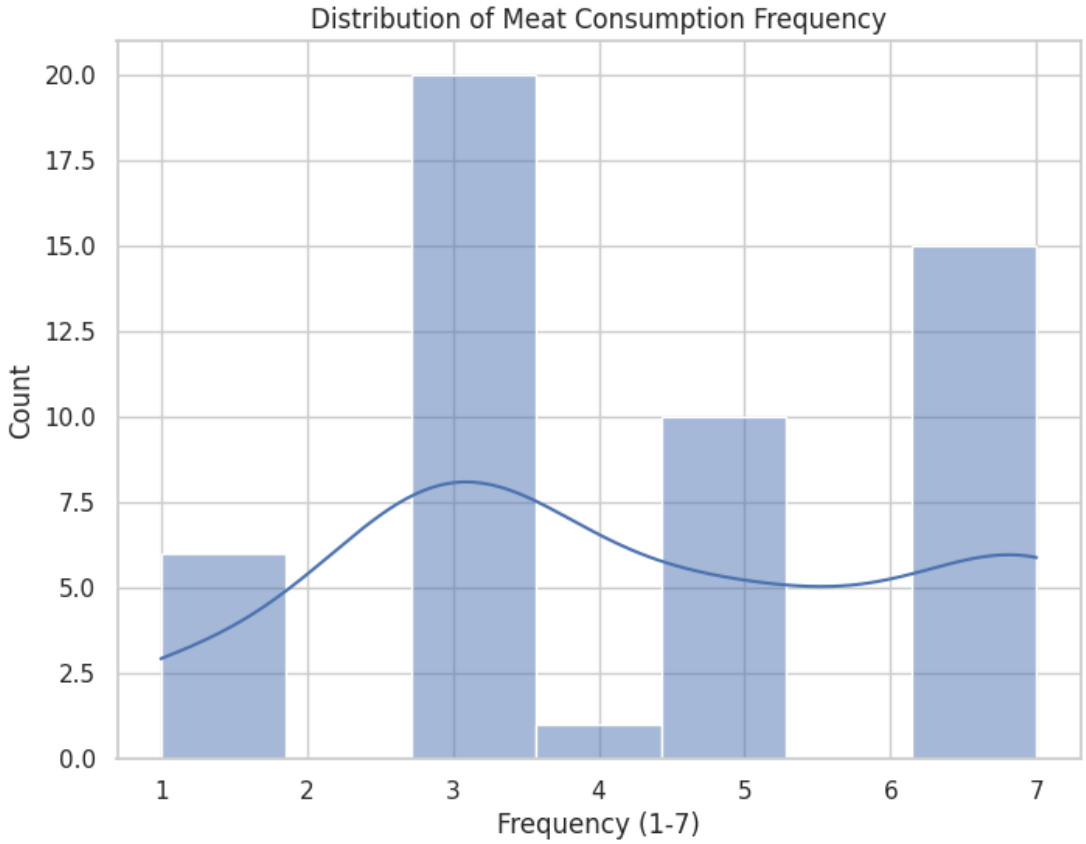
3. Results

3.1 Demographic Characteristics

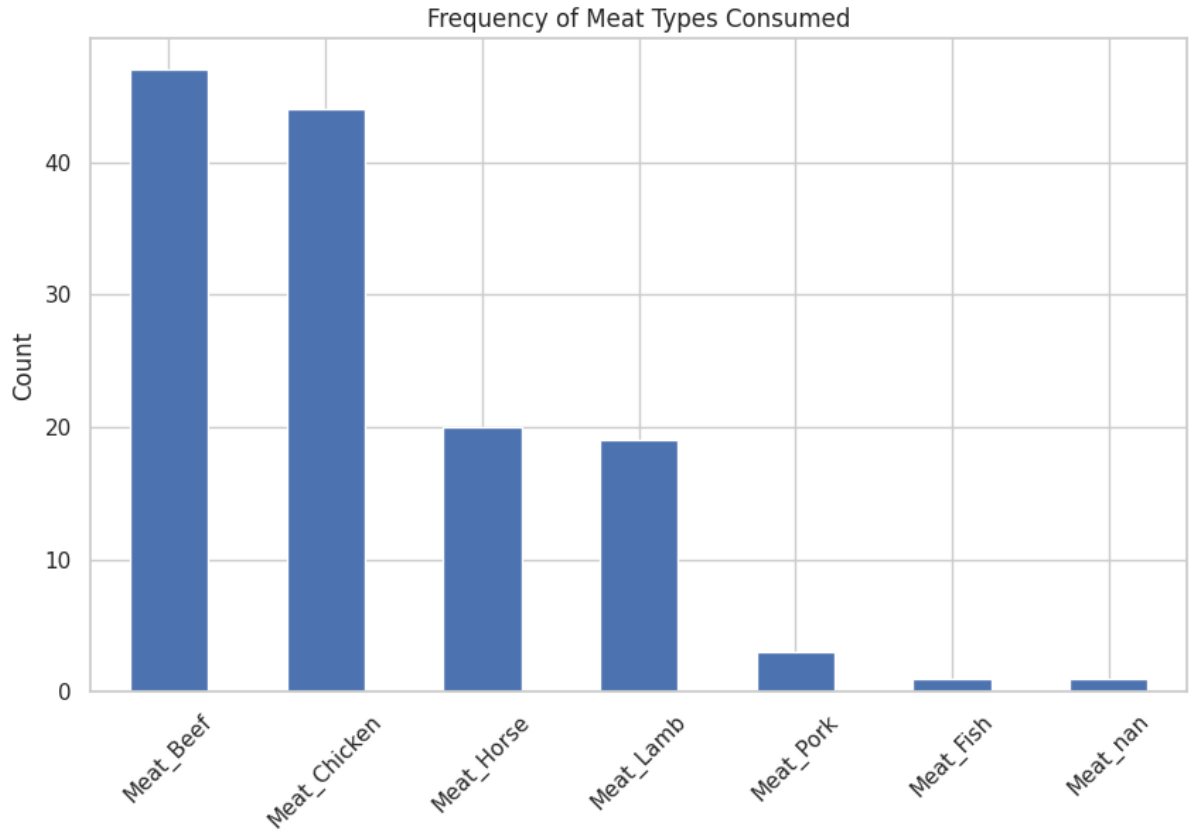


Sample: 84.6% female (n=43), 15.4% male (n=8); age range 0-60 years; mix of urban and rural respondents.

3.2 Meat Consumption Patterns

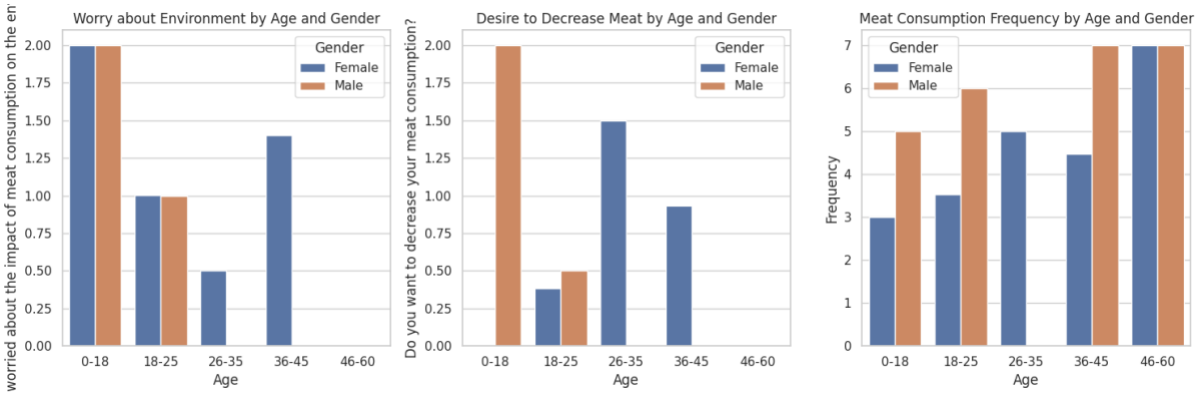


Mean consumption frequency: 3.41 (SD=1.89) on 1-7 scale. Approximately 20% consumed meat daily (≥6); 25% minimal consumption (≤2).



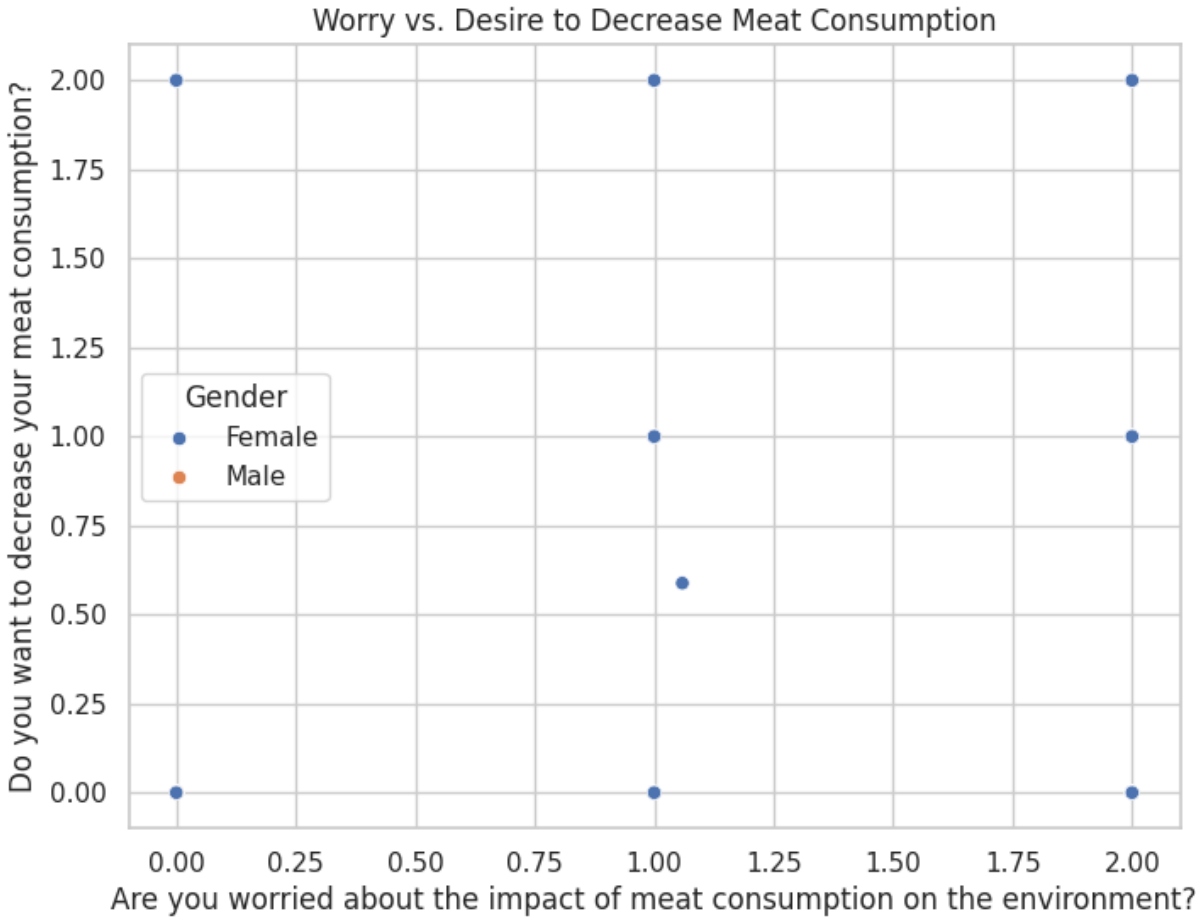
Beef consumption: 92.2% (n=47); Chicken: 84.3% (n=43); Horse: 39.2% (n=20); Lamb: 37.3% (n=19); Pork: 5.9% (n=3); Fish: 3.9% (n=2). These patterns reflect global trends plus culturally distinctive horse meat consumption reflecting Kyrgyz pastoral heritage [7][11][12].

3.3 Environmental Awareness and Willingness



Environmental concern: 64.7% "yes" (n=33); 29.4% "maybe" (n=15); 5.9% "no" (n=3). This 65% rate substantially exceeds international comparatives (Australian survey: 0.9%)[7].

Reduction willingness: 45.1% "yes" (n=23); 37.3% "maybe" (n=19); 17.6% "no" (n=9). This aligns with global flexitarian estimates (14-60%) [7].



Positive association between environmental concern and stated reduction willingness, suggesting environmental awareness influences dietary intentions [7][11].

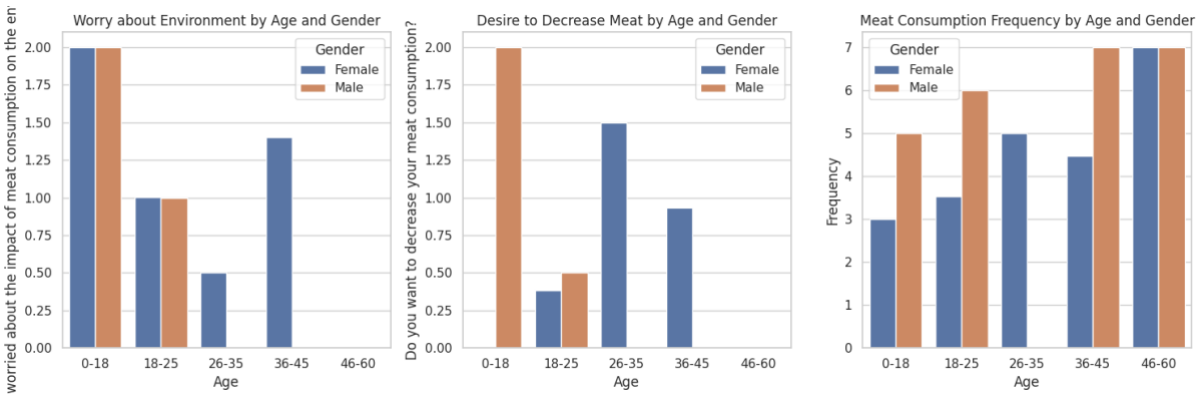
3.4 Traditional Sustainable Practices

Manure fuel (tezek) use: Rural respondents reported active use with primary processing methods (drying, composting), estimated 30-40% cost savings [2].

Waste-based livestock feeding: Majority reported using vegetable peels, food scraps, and garden residues; approximately 30% perceived cost reduction [2][6].

Rural respondents showed substantially higher practice engagement; urban respondents retained cultural awareness with minimal engagement [2].

3.5 Demographic Patterns



Males reported higher consumption frequency; females higher environmental concern. Younger respondents (18-25) and middle-aged (36-45) showed higher environmental concern. Rural-urban differences substantial: rural respondents actively practice; urban respondents retain narrative knowledge [1][9].

3.6 Knowledge Transmission

Respondents chose various ways on how the knowledge is transmitted such as passing from relatives, observation or participation in the activities. The primary knowledge holders appear to be elderly and women were most significantly involved in the daily practices and its transmission. How the individuals participated depended on the family and the location, some appear to be more prone to be engaged though relatives from rural parts, others having heard from family discussions [2].

4. Discussion

4.1 Consumption Patterns and Context

Mean consumption gathered from the survey (3.41/7) closely aligns with the data from literature found online (~1000g/week) [1], being more than WHO recommendation but correctly reflecting the people's nomadic roots and consumption habits, along with the economic patterns of middle income families [1][6][11]. The dominance of beef and chicken also align with the global trends around the world with beef being considered a staple along with luxury cuisine with chicken being cheap and nutritious [7][11]. Horse meat consumption (39.2%) illustrates the distinct consumption culture in Kyrgyzstan with meals such as chuchuk (horse meat sausage) and its general utilization in daily cuisine [12]. Lastly, the minimal consumption of pork (5.9%) reflects the cultural and religious preferences of Kyrgyz people, as majority of the population follow the Islam religions. Although, the major decision on rejecting pork seems to be sue to the perception of pork, rather than religion. [1].

4.2 Environmental Consciousness

The environmental concern rate of 65% is greater than international comparatives [7], suggesting either elevated consciousness or selection bias of the survey. The positive correlation between concern and stated reduction willingness aligns with behavioral science literature indicating environmental awareness influences intentions [7][11]. Due to the nature of the survey and its sharing methods, it is highly likely that there was a big survey bias as majority of the people who responded were people educated/lived abroad or else.

4.3 Traditional Practices: Persistence and Transformation

Traditional practices persist in rural areas with documented 30-40% cost savings, providing continued economic incentive [2]. Substantial rural-urban divergence indicates knowledge transformation rather than erosion—urban respondents retained cultural awareness despite minimal engagement [2]. This reflects broader Central Asian economic transitions and rural-to-urban migration [2]. Additionally, as the rural areas have been urbanized slowly in Kyrgyzstan, some households may have started to prefer other non-sustainable practices that would be more time effective.

4.4 CRITICAL FINDING: Causality Cannot Be Established

This research cannot establish that traditional practices are the primary driver of Kyrgyzstan's low emissions.

Multiple confounding factors likely contribute substantially:

- Geographic factors: Mountainous terrain limits intensive agriculture [6][11]
- Economic development stage: Lower overall industrial emissions as middle-income country [6] [11]
- Energy infrastructure: Renewable energy composition influences emissions [6][11]
- Population density: Dispersed settlement reduces emissions intensity [6][11]
- Industrial development: Limited heavy industry reduces national profile [6][11]
- Methodological variation: Accounting differences affect cross-national comparisons [6][11]

Establishing causality would require longitudinal tracking, controlled comparisons, and life-cycle assessment beyond this study's scope [6][11]. This research project only explores deeper int the sustainable practices of Kyrgyz people, which maybe one of the factors, but not

the primary one. Traditional sustainable practices are still very intriguing and can be utilized in other coutries, however further research should be done in order to prove the causality and correlation.

4.5 Alignment with Literature

Findings seem to align with global meat consumption patterns [1][7]. Documented gender differences correspond to comparative studies [1][9][11]. Knowledge transmission pathways reflect established mechanisms in traditional ecological knowledge literature [2]. Environmental-behavior correlation aligns with behavioral science research [7][11]. Sustainability considerations in middle-income contexts account for food security and livelihood trade-offs [6][11].

5. Policy Implications

To spread this knowledge it is recommended to do an academic documentation and curricular integration in order to actually increase prestige and create educational transmission pathways for the citizens, not only to not lose touch with their roots, but also to learn sustainable practices already ingrained in their culture and help the environment[2].

Economic incentives by the government such as some payment-for-ecosystem-services programs and subsidies would be able promote and sustain practices if cultural incentives weaken and actually raise awareness throughout the area [2][6][11].

Events such as apprenticeships or community events that shed light into how these traditions are not old-fashioned would reverse knowledge erosions among younger populations that are more inclined to believe western ideologies.

6. Conclusion

This survey of 51 Kyrgyz households documented moderate meat consumption (mean 3.41/7) with substantial beef (92.2%) and chicken (84.3%) consumption, distinctive horse meat consumption (39.2%), and minimal pork (5.9%) [1][7][11]. Environmental concern was expressed by 65%— substantially elevated compared to international samples [7]—with 45% indicating willingness to reduce intake [7].

Traditional practices including manure fuel and waste-based livestock feeding demonstrated continued rural prevalence with 30-40% cost savings [2]. Knowledge transmission occurred

through multiple pathways with substantial rural-urban divergence indicating transformation from experiential to narrative transmission [2].

This research cannot establish that traditional practices are the primary driver of Kyrgyzstan's low emissions. Multiple other factors—geographic conditions, economic development, energy infrastructure, population density—do substantially influence national emissions profiles [6][11]. Causal attribution would require tracking of emissions for a longer time and sophisticated life-cycle assessment beyond the scope of this project [6][11].

However, research demonstrates that: (1) traditional practices persist and maintain economic value; (2) environmental awareness correlates with reduction willingness; (3) knowledge transmission endures despite transformation; (4) substantial rural-urban differences exist; (5) transitioning economies require sustainability frameworks accounting for food security and livelihoods [2][6][11]. Which is still significant, as Central Asia, especially Kyrgyzstan is a country with less research than others such as Kazakhstan. This paper was able to shed light on some practices such as manure fuel that to this day are utilized by the population, so that further research would be done by other researchers interested n the topic.

Traditional ecological knowledge represents legitimate sustainability expertise warranting policy consideration [2].

In the future, it is recommended to do longer comparative designs along with life cycle assessments that would clarify the relationship between the traditional sustainable practices of Kyrgyz people and their GHG emission. Additionally, the investigation of how the knowledge is transmitted and the raising of awareness remains critical for the country and research purposes [2][6][11].

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Survey versions, Data, & Code: Can be provided upon request