

Climate Change Impacts on Food Affordability and Access of Various Socioeconomic Groups in Kuwait

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Abstract

Kuwait began its development journey following an oil boom in the 1920s. However, heavy reliance on inexpensive foreign labour has led to wage inequalities between nationals and non-nationals. Low skilled workers receive an average salary of \$918, in comparison to nationals which receive an average of \$2,120 in the public sector. Nevertheless, the escalating food prices caused by climate change endanger food equity and may lead to a loss of which are a crucial part to Kuwait's standard of living. Currently, both nationals and expats allocate approximately 9-15% of their budget for food expenses. It is crucial to anticipate how future budgets will be affected by rising global food prices and the potential impact on different socioeconomic groups in Kuwait. The purpose of this paper is to analyse current spending patterns and food policies in Kuwait. Exploring potential strategies that can be adopted and tailored for ensuring stable food prices, such as establishing new trade alliances, food banks, community food security programs, and promoting nutritional education and awareness. Kuwait's future stability must introduce new policies while also prioritising equitable access to food across all demographic groups within the country.

Keywords: Food Security, Climate Change, Food Equity, Trade.

Introduction

Climate change refers to long-term shifts in temperature and weather leading to alternations in ecosystems and natural resources leading to changes that have significant implications on food security, including food affordability and access. In Kuwait, a small country located in the Arabian Peninsula, climate change poses unique challenges to its food system due to its arid climate and dependence on imported food. One of the major impacts of climate change on food affordability and access in Kuwait is the lack of fresh water resources and arable land. The impact of climate change on the affordability and accessibility of food in Kuwait is a matter of great concern, as it directly affects the well-being and livelihoods of various socioeconomic groups. Climate change has the potential to affect both global and local agricultural production, leading to higher food prices and limited availability. This poses a significant threat to achieving food equity, which refers to how food production and distribution disproportionately affect marginalized communities [1,2]. It is projected that by mid-century and the end of the 21st century, there will be a rise in food costs and living standards, potentially resulting in hunger, poverty, and malnutrition. On top of this distribution

concerns arise due to inadequate access for certain segments of society who lack healthy food options primarily because they are hindered by geographical disadvantages or face exploitative marketing practices motivated by their socio-economic status [2]. It is imperative to establish a fair and inclusive food system that allows all individuals in the community to cultivate, acquire, exchange, sell, dispose of, and comprehend the origins of food. Such a system should emphasise cultural preservation, equal access to land resources, just pricing and wage practices, and prioritise both human health and ecological sustainability.

Prior to the emergence of oil in the 1920s and 1930s, Kuwait was a small nation with a population of approximately 200,000 [3]. The primary sources of income were pearl diving and merchant trading [3]. However, as Kuwait experienced rapid growth and development fuelled by oil revenues, there was a significant increase in demand for foreign workers [3]. The employment of foreign workers became essential for various development programs that aimed to enhance the standard of living for Kuwaiti citizens [4, 5]. These programs focused on filling job vacancies and specifically targeted expatriates who could contribute to

meeting labour demands, particularly in manual labour roles [3, 6]. The heavy reliance on foreign labour and imports in Kuwait creates potential vulnerabilities to climate change impacts. This poses challenges for ensuring equitable access to affordable, safe, and nutritious food for people across different socioeconomic backgrounds, particularly due to the significant wage gap between nationals and expatriates.

Despite being ranked fairly low in terms of self-sufficiency for essential food needs, Kuwait still maintains a relatively high score of 27 out of 100 on the global food security index when considering factors such as affordability, availability, quality, and safety [7, 8]. The expenditures on food and beverages have experienced a significant increase among both nationals and expats, with an increase of 41.7% and 35.4%, respectively, from 1999 to 2013 [9]. Moreover, the cost of living has risen notably since the pandemic in August 2022 alone, with food prices rising a surge of 6.89%. Monitoring price trends and hikes diligently is crucial to mitigate potential turmoil that may arise in the future [10].

Climate change will also have a global impact on trade, leading to shortages of certain raw materials. Taking proactive measures to adapt and ensure future food security is crucial for maintaining social stability and human health. These challenges vary across racial, economic, and geographic lines [2]. From 2005 to 2008, there was a significant increase in world prices for rice, wheat, corn, and soybean - with respective increases of 217%, 136%, 125%, and 107% [11]. By the year 2100, Kuwait's imported food value is projected to rise by over 200% from its current value [12]. Future planning in Kuwait is essential for the well-being of its residents, particularly in terms of subsidies and new policies.

This paper aims to examine the income and spending patterns of Kuwaiti residents to identify groups that are highly vulnerable to rising food prices caused by climate change. It will also explore the impact of climate change on trade and subsidies as crucial factors affecting food accessibility, with a focus on future affordability. Finally, potential solutions and recommended actions for managing food security risks will be discussed for consideration by the Kuwaiti government.

Equitable Food System

Social equity

The present challenges faced by Kuwait, including climate change and rising food prices, pose significant risks to the well-being of both Kuwaiti residents and expatriates. Various demographic factors such as the employment sector, level of education, family size, and expenditures were analysed to identify groups that may be more susceptible to future increases in food prices. It is important to acknowledge the valuable contributions made by expatriates towards the development of Kuwait's society, despite many public benefits being designed primarily for nationals. After experiencing the oil boom in the 1950s, Kuwait's population has grown to 4.8 million individuals as of 2023 with estimates of the population increasing to 7 million by 2030 [40, 20]. with a majority being expats at 68%. However, only a small percentage (31%) of this population consists of nationals. Over time, there has been an increasing disparity between the number of nationals and expatriates residing in Kuwait. Expatriates have been attracted to the country due to better income

prospects and opportunities [3, 15, 16]. Nationalities such as Indians and Egyptians account for approximately 35% of the total population in Kuwait as recorded in year-end data for 2020 [40]. The Indian community particularly has experienced tremendous growth over the past three decades with their numbers reaching around one million by year-end [40]. With such a large expatriate workforce present within Kuwait, this situation creates intense competition within the job market making it more challenging for nationals to secure employment given that higher wage requirements are demanded [17, 18].

According to official data, the government employs approximately 366,000 Kuwaiti nationals, which forms 80% of the total government workforce [19, 9, 20]. However, despite the high level of government employment, the average wage for a Kuwaiti employee in the public sector is \$2,120, which is relatively less than an employee in the private sector. The government's reliance on oil revenues to fund its operations and pay salaries means that government budgeting and salaries are strongly linked to oil prices. This dependence on oil revenue is not sustainable over the long term, as the global oil market is volatile and subject to various economic and political factors [21].

There are various government initiatives to encourage Kuwaiti employment in the private sector, yet only 5% of the overall private workforce makes up Kuwaiti workers, indicating a significant gap in Kuwaiti nationals' representation in the private sector [9]. In a survey conducted between 2019-2021, Kuwaiti nationals in the private sector earned an average of \$2,473, with the highest average income from nationals working in both the private and public sectors with an average of \$2,580 (Table. 1). The survey also revealed that 80% of the nationals earn \$6,520 with only 1.4% earning less than \$3,250 Table. 1 [9]. Overall, Kuwaiti nationals may not face an immediate risk depending on oil revenues, but a small percentage of Kuwaitis earning less than \$3,250 could be at risk if there are no policies in place to aid them.

Expats play a key role in the development of Kuwait, performing many of the jobs required to maintain a developed country with a high standard of living. 27% of expats work within the public sector while the rest work within the private sector. The two largest sectors occupied by expats are personal and protective service workers which employ 654,934 people are drivers and mobile plant operators which employ 402,255 people. These two professions alone account for 42% of the total labour force employed in Kuwait and based on statistical analysis, 60.1% receive a salary below \$3,256 and an average of \$918 [9]. The results from the analysis are not in line with the averages presented by Al-Qudsi et al. (1985) [5]. That determined that expats receive an average of \$1700. However the lowest paying jobs are performed by manual labourers which receive \$250-320/month [22, 23, 3]. Where as, domestic workers make an average of \$435 the lowest paying job in comparison to all sectors (Table. 1).

The high proportion of low-paid workers in Kuwait's private sector is a concerning issue that could have significant implications for the country's future development especially when there is a large income gap between expats and nationals, with nationals earning \$1000 or more (Table. 1). If food prices continue to

rise workers may be unable to afford necessities such as food and shelter, and may be forced to seek better employment opportunities elsewhere, leading to a potential loss of skilled workers. This, in turn, could hamper Kuwait's ability to innovate and grow, hindering economic development.

Education is recognized as a crucial determinant of an individual's earning potential, with higher levels of education often leading to greater access to high-paying job opportunities. According to Alqattan et al. (2012), investing in education aids in earning higher salaries, as evidenced by a 5.2% increase in returns [24]. However, regardless of the level of education, there is a considerable income disparity between nationals and expats with nationals earning \$1,000 more (Table. 1). The lowest income are expats with an elementary level education earning \$567 compared to a national which earns \$1,716 by far the biggest disparities (Table. 1). Even with a university degree the discrepancy between nationals and expats is extensive with a difference of \$1,500 (Table. 1). In 2015 the unemployment rate was highest for nationals with an educational level of primary and below at 9.4% compared to expatriates which are estimated that only 0.1% of them are unemployed [9]. Due to their lower wages, many companies in Kuwait are incentivized to hire expats with elementary-level education, resulting in this group representing 69.2% of the total expat labour force in the country [23]. Expats with a low educational level or no education would be the most impacted by price hikes and the government should incentivise educational solutions.

The number of individuals in a family plays a crucial role in shaping their expenditure patterns, as larger families necessitate higher incomes to meet essential costs. The average family size of nationals varies between four and nine members, with 26.8% comprising six to seven individuals [9]. Conversely, expatriate families typically have smaller sizes ranging from one to five people and are most commonly composed of four to five members [9]. The KASA 2019-2021 study discovered a noteworthy negative association between income and family size, regardless of nationality or expatriate status. Specifically, families with ten or more members exhibited considerably lower average incomes compared to those with nine family members or less. Nationals had an average income of \$1,995 while expats had the lowest average income at \$615 (Table. 1). This demonstrates that both nationals and expats in larger families tend to have lower individual incomes when compared to smaller families. Notably, large expat families face vulnerability due to their lowest per capita income; this situation raises concerns about their ability to cope with increasing living costs.

Food Affordability

Household expenditures are a crucial metric for assessing price volatility and analysing consumer spending patterns. A survey conducted by the Central Statistics Bureau of Kuwait between 2019 and 2021 revealed significant differences in expenditure patterns between nationals with different family sizes, educational levels and employment sectors. On average, nationals spent \$1,960 per person per month with the highest monthly expenses being from small families with 1-3 members, employees with a bachelor's degree and unemployed nationals [9]. On average nationals spend 8.9% of their incomes on food and beverage

es and the highest spenders are families between 1-3 members, nationals with no high school diploma and government employees spending 11.3%, 12.7% and 9.46% respectively (Table. 1). Furthermore, there is a negative association between increasing education levels and expenditures on food and beverages among nationals. Those with higher education levels, such as graduate degrees, spent only 8% of their expenses on food and beverages compared to those with a high school degree, who spent 12% [9]. Overall, nationals currently spend only 10% of their income on food and beverages, which suggests that price hikes on these commodities may not have a significant impact on their spending habits especially when nationals are more responsive to changing food prices (Table. 1). However, nationals with lower incomes, smaller families or limited education may remain vulnerable to rising food prices. They may need to adjust their household budgets accordingly.

When comparing household expenditures between 2013 and 2019, there was a noticeable increase in overall spending. Nationals experienced a 6.5% increase in their average budget, rising from \$10,071 to \$10,755. The food and beverages budget also increased by 5%, rising from \$1154.94 to \$1,211. There was no change in the percentage of their expenditures on food and beverages which remained at 11%. On the other hand, expats saw a significant 34% increase in their total budget, up from \$2,473 to \$3,494. While their average food budget decreased from 17% to 15%, the funds allocated for food and beverages increased from \$430 to \$521. Between September 2018 and December 2022, the Consumer Price Index for food and beverages increased by 29.5%, reaching 127.6 points [9]. Expats experienced a significant rise in their average budget, potentially indicating higher disposable income for non-essential expenses. Although food and beverage prices increased during this period, both nationals and expats did not appear to be significantly affected by the change. Instead, their spending habits remained relatively similar, with only slight increases in food and beverage budgets. This suggests that households in the region have adapted to changing economic conditions without significantly altering their consumption patterns. While Hasegawa (2018) noted from a study that by 2050 food prices could increase by 20% and 110% in 2100. This could increase money spent on food and beverages to 27-30% within 25 years, however in the 21st Century food and beverages may be the main expenditure for low-wage employees taking up almost 46-50% of their income [64].

Lastly, gaining insight into consumers' buying patterns can provide valuable information about their access to food. According to a study conducted by the CSB in 2021 [9] expats exhibit more diverse purchasing habits and are likely to buy from various outlets including supermarkets, co-ops, and small establishments. However, only 19% of expats are willing to take advantage of store discounts. In another study published in 2021 by Altarrah et al., found that Kuwaitis and expats differed significantly in terms of levels of concern regarding financial constraints during the COVID-19 pandemic [60]. Expats showed greater concern about purchasing food compared to Kuwaitis (17.6% vs 2.6%; $p < 0.001$) [60]. Understanding consumer behaviour can assist government policies related to food procurement and supply subsidies when necessary.

Table 1: The average income, expenditure and expenditure on food and beverages based on family size, education and occupational sector. The statistical results are presented on a per-person basis and consider the rental costs of housing owned by Kuwaitis Adapted from [9].

	Average Income on Family Size per Person (US\$)		Average Expenditures on Family Size per Person (US\$)		Average expenditure on Food and Beverages Depending on Family Size per Person (%)	
	Nationals	Expats	Nationals	Expats	Nationals	Expats
1-3	3,327.51	1,170.89	2,997.24	1,080.36	11.30%	15.18%
4-5	2,603.66	909.34	2,290.15	831.63	10.22%	14.94%
6-7	2,381.85	782.47	2,031.63	774.90	9.40%	14.77%
8-9	2,169.43	640.13	1,898.95	690.47	8.43%	15.25%
10+	1,995.58	615.06	1,623.48	720.79	7.51%	13.34%
Average	2,291.10	918.64	1,960.24	869.77	9.37%	14.69%
	Average Income Depending on the Level Education (US\$)		Average Expenditure Depending on the Level Education per Person (US\$)		Average expenditure on Food and Beverages Depending on the Level Education per Person (%)	
No high school diploma	1,875.93	631.76	1,807.34	671.56	12.73%	16.12%
Elementary school	1,716.72	567.47	1,578.49	622.33	10.72%	16.82%
Middle school	2,012.24	700.80	1,877.43	746.54	9.46%	16.46%
High school diploma	2,074.21	758.73	1,834.08	770.99	9.83%	16.03%
College or technical training	2,247.48	901.32	1,941.00	867.16	8.68%	15.98%
Bachelor's degree or higher	2,620.36	1,141.59	2,108.57	1,007.99	8.13%	13.75%
Average	2,291.10	918.64	1,960.24	869.77	9.93%	15.86%
	Average Income Depending on Job Sector (US\$)		Average Expenditure Depending on Job Sector per Person (US\$)		Average expenditure on Food and Beverages Depending on Job Sector per Person (%)	
Government	2,120.96	1,030.23	1,846.14	931.71	9.46%	14.63%
Private	2,473.43	889.56	1,892.10	850.21	8.24%	14.92%
Government + Private	2,580.39	1,070.88	1,810.60	982.24	9.29%	16.89%
Cooperative	3,003.86	652.33	1,864.72	712.64	9.25%	19.12%
Domestic Worker	-	435.83	-	512.15	-	20.56%
Other	-	1,223.18	-	812.72	-	9.71%
Not Employed	2,382.99	953.26	2,043.69	928.12	8.76%	14.89%
Average	2,291.10	918.64	1,960.24	869.77	9.00%	15.82%

Climate Change Impact on Trade

Climate change will affect not only Kuwait but also agricultural regions globally and regionally impacting trade as prices will be affected by domestic changes. Food imports from the Middle East and North Africa (including Gulf Cooperation Committee countries) account for the majority of Kuwait's food imports, but only 30% of total food imports [26]. A similar amount of food is imported by countries in Europe and Central Asia (27%), and nearly as much is imported by countries in South Asia (13.5%) and East Asia and the Pacific (12.5%) [26]. Kuwait's largest vegetable export supplier is India, followed by the United States and Australia. This demonstrates that Kuwait's global food security strategy extends beyond the region as well [26].

A computable general equilibrium (CGE) model developed by Atkinson and Gelan [12] evaluated food security for Kuwait, finding that prices of imported food products would rise sharply in the domestic market after 2030 under all Social Socioeco-

nomic Pathways (SSP) scenarios [12]. In SSP5, import food prices are projected to increase nearly 4.5-fold from 2010, while in SSP1, prices will increase nearly 2.5-fold. The other scenarios are between these two extremes [12]. Nonetheless, according to Havlik et al. (2015) and OECD, net exports are also projected to increase in the Middle East [29, 30, 65]. Climate change effects are limited to global levels in 2030 and are aggregated across crops [29]. However, as climate change progresses, trade becomes increasingly important for adaptation, resulting in an increase in agricultural trade of 0.4% and 1.2% in global production between the ten different macro-regions in 2080 based on RCP 8.5 with and without CO₂ effects [29].

Using the underlying storylines of the respective SSPs, Weibe et al. (2015) [86] analysed two scenario variants to explore trade policy assumptions: SSP 1 with more liberalized agricultural trade and SSP 3 with more restricted trade [2]. Compared to the no-change case earlier reported, an average increase of 4.3 % is

expected under SSP 1's more liberalized trade policy in comparison to 8.0 % under the business-as-usual trade policy [2]. On the other hand, with more restrictive trade policies in SSP 3, trade is expected to decline and prices to rise by 25.2%, compared to 15.5% with business as usual [2]. Additionally, there is a wider spread between crops and models [2]. Strategies and policies should take into consideration the different scenarios and plan accordingly.

As an adaptation strategy, international free trade (liberalisation) can reduce global risk and price volatility. A free trade system can act as a buffer between direct local damages in output (e.g., natural disasters) and indirect losses in utilities (e.g., humanitarian disasters) when different nations or regions face heterogeneous risks resulting from external changes [31]. Presently, there are several regional trade arrangements that have incorporated provisions for further liberalisation of agricultural trade, such as the EU-Mediterranean Association Agreements (EMAAs) phasing out tariffs on manufactured goods [32, 33]. There is also the bilateral free trade agreement (FTA) that is part of the US – Middle East free trade initiative [32]. As well as the Agadir Agreement for the establishment of a Free Trade Zone between the Arabic Mediterranean Nations (Agadir), the Greater Arab Free Trade Area (GAFTA) liberalising intra-Arab trade over a period of ten years, starting in 1998, mainly through phasing out tariffs, Gulf Cooperation Council (GCC), Arab Maghreb Union (AMU), Common Market for Eastern and Southern Africa (COMESA) [34, 32, 33]. There is also, the Pan-Arab Free Trade Area (PAFTA) which is a free trade area agreement which specifies the elimination of customs duties and other fees and duties having similar effects, the elimination of all non-tariff barriers, including administrative, monetary, financial and technical barriers and the preferential treatment for least developed member states [35]. The International Food & Agricultural Trade Policy Council (IPC) and the International Centre for Trade and Sustainable Development (ICTSD) launched the ICTSD-IPC Platform on Climate Change, Agriculture and Trade: Promoting Policy Coherence [36]. However, it is through the formation of new agreements and working together will the heavy risks that may appear from climate change be able to be mitigated.

Subsidies

Kuwait can be classified as a rentier state due to its reliance on subsidies. These subsidies are a part of the social contract, which serves to legitimise non-democratic governance [37, 38]. Consequently, this reduces the political incentives for governmental bodies to make independent decisions [37, 38]. Subsidies such as energy and water are universal in Kuwait with the exception of education and food, which are reserved for nationals [39, 40]. Food ration cards are distributed to all nationals by The Ministry of Commerce where products like rice, sugar, oil, milk powder and others are available for purchase at a reduced cost. However, it should be noted that fresh produce like fruits, vegetables, and herbs are not included in these subsidies. This amounted to \$1.16 billion in 2015/2016 supporting 1.8 million residents [39]. Notably, these subsidies account for approximately 20 percent of Kuwait's Gross Domestic Product. In 2003 alone, a total of approximately \$17 million was allocated for essential food items, which accounted for about 0.3% of the overall expenditure. Some food items have been regulated such as cost of falafel sandwiches and bread. The Ministerial Decree 44/1984, which

is set to cost \$.014 for bread and \$0.30 for falafel and mandates restaurants also to have a minimum of two falafels in each sandwich under the late Amir Sheikh Jaber Al-Ahmad Al-Jaber Al-Sabah [41]. The decree has lasted over 30 years without any alterations and continues to be enforced by government officials.

Although access to subsidised food provides a safety net for all nationals of different incomes there remains the disparity between expats and nationals. Additionally, the provision of subsidies may distort the market by artificially reducing the prices of subsidised goods. This situation could discourage local production and result in excessive dependence on imports, which may not be viable in the long run [50]. It is crucial to find a middle ground between bolstering domestic agriculture and maintaining reasonable food costs. Also, subsidies can foster the misuse, inefficiency and waste of resources [42]. The likelihood of success for redistributive schemes such as ecological tax reforms and feed-in tariffs are minimal in this context. The long-term feasibility of relying on subsidising basic food commodities is questionable due to the vulnerability exposed by fluctuating barrel prices since their normalisation occurred in 2014. Kuwait experienced a deficit equivalent to 13% of its GDP in the years 1991-92, following a decline from 27% in the preceding period [43]. Furthermore, with increasing populations resource management will be essential if the government continues to provide food rations in the long term [39]. Thus, in light of future oil & food price trends government spending patterns will likely be greatly influenced.

Strategy Adoption and Adaption

To tackle the challenges of climate change on food affordability and access in Kuwait, a range of adaptation strategies can be utilised. These may involve enhancing agricultural practices and technologies to boost productivity and resilience, endorsing sustainable farming methods, decreasing dependency on imports by diversifying food sources, encouraging local food production, investing in infrastructure for storage and distribution, and implementing social welfare programs to aid vulnerable socio-economic groups. Moreover, effective implementation of these adaptation strategies requires collaboration between government entities, private sector organisations, and civil society actors from various sectors. The adoption of such strategies is especially crucial in light of Kuwait's commitment to the United Nations Agenda 2030, which aims to promote sustainable development for long-term prosperity [44, 45]. In September 2015, Kuwait adopted Agenda 2030 as part of its Kuwait Vision 2035 or New Kuwait 2035. The vision comprises 17 sustainable development goals and a comprehensive set of 169 measurable targets [44, 45]. This vision emphasises seven key pillars to promote income diversification through innovative methods and address disparities in employment between nationals and expatriates. Additionally, it aims to enhance the performance of socioeconomic actors [46, 47, 44]. To accomplish these goals in line with both Kuwait Vision 2035 and Agenda 2030, Kuwait developed the Kuwait National Development Plan. This plan serves as a backbone by providing strategies, guidance, and execution oversight of 112 projects involving 85 different public and private sectors (Table 2) [44]. These goals encompass climate change mitigation, the protection and preservation of ecosystems such as oceans and deserts, ensuring access to economically viable energy sources for residents, and developing cities that cater to

essential needs [44]. These projects aim to enhance air quality monitoring systems, develop smart city infrastructure, encourage the use of renewable energy sources, and improve water management techniques in residential areas and agriculture. The Ministry of Finance and the General Secretariat of the Supreme Council for Planning and Development are responsible for financing and overseeing the implementation of the plan. They receive regular progress reports on all projects. Food security is an important aspect of the pillar dedicated to fostering a sustainable and diversified economy. Government entities have a mandatory obligation to identify and focus on specific sectors within the agro-food industry, while also establishing attainable and practical production targets. It is essential to conduct a comprehensive assessment of agricultural policies, legislation, and regulations to ensure their alignment with the food security strategy change to targets.

One of the challenges, which hinders the achievement of its targets and objectives. According to a report from UNDP in 2020, Kuwait falls behind in four sustainable development goals, with limited advancements made in consumption and production, climate action, industry, and innovation compared to other mentioned SDGs [46, 44]. Accurate statistics on agricultural production and industry are crucial for effectively managing agricultural production and informing relevant organisations and the general public about agriculture's current state. This would facilitate better control, evaluation, and planning of the agricultural economy at various levels, as well as support scientific research in this field. To accurately assess the effects of climate stressors and predict future food trends, demands, and production needs, it is crucial to establish long-term monitoring programs. To enhance the effectiveness of these initiatives, it is essential to implement standardised approaches developed by experts in research and policy. These approaches should be used to assess the cost, relative pricing, and accessibility of both healthy and unhealthy diets [48, 49]. Collaboration between the Ministry of Health, Public Authority of Food and Nutrition and the Ministry of Finance is crucial for collecting data on food prices, diet costs, and affordability. This data will inform policy decisions. Access to tools and databases is also essential for estimating expenses related to healthy diets across countries and providing technical support.

Affordability of food plays a critical role in shaping dietary patterns. Fluctuating food prices can impact the purchasing power and consumption habits of individuals and households. Research has shown that during periods of economic instability or price increases, individuals may choose cheaper, less nutritious food options or reduce their overall intake [50, 51]. Higher food prices also have an impact on the availability and consumption of certain types of foods. When prices rise, individuals tend to opt for more affordable but energy-dense, nutrient-poor choices, which can negatively affect diet quality and overall health. In the case of Kuwait a significant finding from Alalo et al., (2020) concluded that nationals are more responsive to them in regards to food purchases, stating that an increase in income by 1% leads to an increase in food expenditures by 0.47%. Another inference from the paper also noted that nationals are more likely to reassess their food expenses according to changing food prices [25]. This trend often leads to increased consumption of processed and fast foods that lack essential nutrients. Promoting education

and awareness about the impact of food prices on diets can empower individuals to make informed choices. Understanding the relationship between food prices, nutrition, and health enables conscious decisions to prioritise nutritious options within budget constraints. Educational initiatives should focus on building cooking skills and promoting locally available, affordable, and nutritious food consumption.

Some key findings from the available research: have estimated the price elasticity of demand for food, which measures the responsiveness of food consumption to changes in prices. The estimated price elasticities range from 0.27 to 0.81 (absolute values) [52]. This indicates that a 10% increase in food prices, on average, leads to a decrease in food consumption ranging from 2.7% to 8.1%.

The impact of food prices on consumption varies across different food groups. In low-income countries, increases in food prices have a stronger impact on food consumption compared to high-income countries [53]. Animal-source foods, such as meat, fish, and dairy, tend to have higher price elasticities than dietary staples like cereals, fats and oils. This suggests that animal-source foods are considered luxury items in the human diet and are more sensitive to price changes. Changes in food prices can also lead to substitution effects, where consumers switch to alternative food options based on price changes. For example, studies have shown that price decreases for certain food items, such as fruits and vegetables, can lead to increased consumption of these healthier options. Similarly, price changes representing taxes on saturated fat, sugar, and salt have been found to increase the purchase of healthier food choices [54]. Rising food prices can have a disproportionate impact on vulnerable populations, particularly those with lower incomes.

Community food security programs can play a crucial role in improving food access and addressing issues of food affordability. These programs aim to ensure that all individuals and communities have access to nutritious and affordable food options. Food sovereignty is a concept that emphasises the rights of individuals and communities to control their food systems. Community food security programs that adopt a food sovereignty approach prioritise local food production, distribution, and consumption. By supporting small-scale farmers, promoting local markets, and encouraging traditional food practices, these programs enhance the resilience and sustainability of local food systems, community gardens, and food banks. Community gardens provide opportunities for individuals and communities to grow their food, promoting self-sufficiency, reducing transportation costs and promoting the consumption of fresh, locally-grown produce. Also fosters community engagement, education, and social cohesion, creating spaces where knowledge about sustainable agriculture and climate-resilient crops can be shared [55]. These gardens can be established in urban areas, rooftops, or vacant lots, making efficient use of limited space and contributing to greening efforts. Food banks also play a vital role in addressing immediate food needs and ensuring access to affordable and nutritious food for vulnerable populations [56]. The food bank can refer to one of two types of service: a large redistributor of rescued food to smaller charities that provide cooked and/or uncooked food to food insecure populations, or a service that provides grocery items directly to clients [57, 58, 56]. Food

banks can collaborate with community gardens to provide fresh produce and increase the availability of nutritious food options for individuals and families facing food insecurity [55, 14]. Ad-

ditionally, food banks can offer educational programs on nutrition, cooking, and budgeting, empowering individuals to make healthier food choices and maximise their resources [56].

Table 2: Summary of key projects with estimated costs and year of completion from different pillars of the New Kuwait 2035 plan focusing on food production, education, government interactions and health (adapted by New Kuwait, N.d.).

Pillar III: Promoting a Dynamic Private Sector					
Entity	Project Name	Overview	Goals	Budget (\$)	Completion
KISR	Salmon and Seabass Fish Farming	To ensure fresh marine food security, reduce the pressure on natural fish stocks in Kuwait by developing a research unit for salmon, sea bass and shim fish and to develop Zubaidi fish and cucumber farming techniques.	An innovative initiative is developing research units for rays, salmon, seabass, and zubaidi, pioneering sustainable fish farming. Utilising alternative energy, the project aims to produce one million fingerlings, ensuring environmental responsibility.	7,776,000	2027
KISR	Modern farming systems	Enhance food security through modern technologies for protected agriculture, aquaculture, and the use of renewable energy resources and treated sewage.	The initiative encompasses establishing state-of-the-art greenhouses spanning 6,000 sqm, featuring cutting-edge controls and solar panels. Additionally, 3,000 sqm aquaculture basins powered by solar energy promote sustainable production. With an emphasis on agricultural waste recycling, integrated pest control, and customised production models for diverse commodities.	1,340,000	2025
KISR	Fish and Shrimp Farming Complex	An integrated complex for fish and shrimp production. It features specialised buildings for every production stage, laboratories, training rooms, and factories for processing and packaging, thereby enhancing the country's food security.	The project aims to achieve annual production targets of one thousand tons of marine fish and 250 tons of shrimp.	4,800,000	2029
KISR	Marine Biology Resource Management	Establishing a national research unit for marine sciences, for documenting, evaluating, and safeguarding vital sea resources. And serving as the official research authority for the country's decision-makers concerning the marine environment.	Building a 3,000 sqm research facility, for monitoring and addressing environmental changes through integrated management of marine and coastal resources. Assisting in optimising fish wealth, preserving biodiversity, and ensuring a thriving marine environment.	20,412,000	2027
KDIPA	New Economic Zones	Creating economic zones in Abdali, Al Wafra, and Al Naayem, enhancing Kuwait's investment climate, promoting technology transfer, generating employment, and positioning Kuwait as a key commercial hub for local and foreign investors.	Establishing economic zones. The focus is on developing nineteen square kilometres of allocated lands to attract a significant influx of foreign investments into Kuwait.	9,440,000	2024
Pillar IV: Promotion of Local and Organisation Talents					
Youth Public Authority	Empowering youth in entrepreneurship	Empowering Kuwaiti youth in the field of entrepreneurship, by refining their skills and training them in skills through business incubators.	Empowering Kuwait youth by creating job opportunities in the private and public sectors working in creative industries and craftsmanship. The initiative will also assist emerging companies grow their business by developing investments.	2,444,677	2027
Youth Public Authority	Implementing the national youth policy	Assisting entrepreneurs in establishing projects which can fulfil local market requirements and assist the youth's capability to identify projects that match their capabilities.	Creating policies such as The Professional Entrepreneur Program, Youth Creativity League Program, Our Playgrounds Program, Academic Digital Library Program, and Action Makers Development Project National Youth Policy.	6,200,000	2025

-	Employment Centers	Establishing employment centres to employ, guide and qualify the largest possible number of Kuwaiti youths to work in the private sector and highlight the financial and functional advantages.	The initiative promotes the national workforce by establishing 40 employment centres, aiding 2,000 job seekers annually, including graduates and professionals. It assists 1,000 individuals in training annually and promotes 3,000 private sector job opportunities.	8,125,577	2028
-	Financial Market Sector Knowledge Entity	This project directly means establishing institutes specialised in training workers in the financial markets.	Kuwait is transforming its financial markets through strategic collaborations with global educational bodies, aiming to engage with foreign investors and enhance market efficiency. Efforts focus on efficient training, bolstering the knowledge economy. Raising financial literacy prevents losses, fostering a secure investment culture.	2,444,677	2025

Pillar VI: Developing a Cohesive and Interlinked Government

-	Providing highly skilled workers that raise the quality rate in the local market	Raising the efficiency of the labour market performance by updating working requirements based on the needs of the labour market. Adopting laws and decisions that guarantee commitment to professions and approving them in all sectors related to the labour market.	The project aims to achieve multiple objectives, including enabling individuals to take professional tests, identifying job demands, and establishing collaborations with educational institutions for testing services. Furthermore, it focuses on filtering labour market inputs via tests and ensuring adherence to a legal framework for the approved professions.	2,352,240	2028
-	Data Exchange Platform for the Government	The government data exchange platform boosts agency efficiency and co-operation, eliminating paper document requests. It enables verification directly through the system, enhancing agencies' ability to provide seamless services to the public.	The project aims for extensive government service improvements, connecting twenty agencies on a unified platform, reducing processing time to one day, enhancing security, minimising errors, and increasing citizen satisfaction by sixty percent.	5,184,000	2026

Pillar VIII: Promoting Public Health and Well-being

-	Project to combat obesity in children in the State of Kuwait	The health initiative targets reducing anaemia among pregnant mothers, increasing child-friendly hospital births, and promoting breastfeeding and healthy nutrition for children.	The project involves developing maternity and childhood services in health facilities and enhancing the nutrition of school students. Goals are to lower mothers suffering from anaemia by 5%, increase child-friendly hospitals by 6%, and increase breastfeeding by 5%. Furthermore, raising awareness on health issues, enhancing healthcare workers' skills, improving nutrition services at schools, and combating maternal and child health issues.	486,000	2025
Youth Public Authority	Developing Youth Centers	The Youth Centers Development Project focuses on activities related to enhancing the capacity of young people in the field of innovation, science and technology through a centre specialising in science, technology and scientific research for youth.	The initiative is a comprehensive endeavour aimed at empowering the youth of Kuwait. Through rigorous training programs, 7,120 individuals, with essential skills related to scientific research and technology. Providing 9,680 individuals with diverse activities such as specific initiatives, training projects, and volunteer opportunities. These efforts focus on forty distinct initiatives, fostering a culture of science, technology, and humanitarianism.	4,827,600	2025

Ministry of Foreign Affairs	Human Rights Efforts and Training	Project aims to elevate human rights awareness and commitment in the country by emphasising Kuwait's positive global image and collaborating with local NGOs.	The project will focus on organising four seminars in the field of human rights held annually. Furthermore, publishing 20,000 publications to highlight the role of the State of Kuwait in the field of human rights.	3,276,369	2024
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Conclusion

Kuwait is confronted with a range of future challenges that necessitate the implementation of an adaptation and development plan. This plan should consider various scenarios to effectively address issues related to food accessibility and security, particularly considering climate change. The existing wage gaps between nationals and expatriates may pose potential risks moving forward. To mitigate these risks, measures such as introducing subsidies for increasing food prices and ensuring safer working conditions for expatriates could be explored, to retain a robust labour force necessary to maintain a desired standard of living. However, it is crucial to strike a balance between employing nationals and expatriates since relying heavily on government sector employment for most of the Kuwaiti population may not be sustainable in the long run. It is important to also prioritise the needs of low-wage workers, specifically those with limited education and smaller families, as they are at risk of spending a larger portion of their income on essential expenses. Developing new regional and global trade alliances can help alleviate any shortages that may arise in a country. Policymakers in Kuwait must consider factors such as rising shale oil prices, changes in trade policies, and climate change when determining the future path for the country. To effectively address climate change risks and maintain socioeconomic stability, it is crucial to foster international collaboration. Adaptation strategies involve community engagement to encourage local participation towards achieving shared societal responsibility [59-84].

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Author Contributions

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