THE REPUBLIC OF TURKEY
ANKARA UNIVERSITY
GRADUATE SCHOOL OF SOCIAL SCIENCES
ECONOMICS DEPARTMENT

THREE ARTICLES ON POVERTY, EDUCATIONAL MOBILITY AND HUMAN DEVELOPMENT IN IRAQ

PhD Thesis

Ahmed Taha Bilal

Ankara, 2025

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Supervisor

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10/01/2025

THE REPUBLIC OF TURKEY

ANKARA UNIVERSITY

To the Directorate of the Institute of Social Sciences,

I hereby declare that all information in my doctoral dissertation, titled “Three Articles on Poverty, Educational Mobility, and Human Development in Iraq (Ankara 2024),” prepared under the supervision of Assoc. Prof. Dr. F. Kemal KIZILCA, has been collected and presented in accordance with academic standards and ethical principles. I have fully and accurately cited all sources referenced in the text and bibliography. I affirm that I have adhered to scientific research and ethical standards throughout the research process, and I accept any legal consequences should there be evidence to the contrary.

10/01/2025

Ahmed Taha Bilal

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1. INTRODUCTION

Iraq’s recent history faces a complex array of socioeconomic challenges shaped by decades of conflict, political instability, and economic volatility, beginning with the Iran-Iraq War, the occupation of Kuwait, and subsequent economic sanctions in the 1990s. The 2003 invasion, sectarian violence, and the war against the Islamic State of Iraq and Syria (ISIS) destabilized the country, severely weakening its infrastructure and institutions. A significant portion of national resources were diverted to military efforts, at the expense of providing many basic services and dignity to many Iraqi citizens. The instability has had a profound impact on nearly every aspect of the country’s social, economic, and political fabric.

One of the most pressing issues facing Iraq today is poverty. A substantial number of Iraqis are anticipated to fall into poverty which is estimated to range between 2.7 and 5.5 million Iraqis because of various shocks the country faces, such as the collapse of the global oil market during the COVID-19 pandemic. Therefore, identifying and analyzing the factors that significantly influence poverty, especially at the family level, is essential for formulating effective government policies. Theoretical frameworks have long emphasized key factors influencing the economic conditions of individuals and families. Becker's Human Capital Theory posits that education enhances skills and productivity, directly impacting economic outcomes and family stability (Becker, 1993). Additionally, Bourdieu's framework highlights the significance of various demographic factors in shaping a family's economic status (Bourdieu, 1986). The employment status of the family head is also crucial for poverty alleviation; Doeringer and Piore argue that stable, well-compensated jobs, particularly in the governmental and large private sectors, significantly contribute to a household's financial stability and reduce poverty risks (Doeringer & Piore, 1971). In Chapter Two, I will identify the primary factors that significantly affecting the economic conditions of Iraqi families by

examining a wide range of factors. This chapter uncovers substantial variations in the factors influencing family poverty across Iraq by first testing at the national level, then analyzing households by urban and rural residence, distinguishing between the Kurdistan Region of Iraq (KRI) and the rest of Iraq (RI), and categorizing families based on the employment sector of the household head. Through this detailed, multi-layered framework of national, regional, and employment sector classifications, the analysis provides a comprehensive understanding of the unique drivers of poverty within each context.

Educational attainment is a key determinant of an individual's economic status, as will be demonstrated in Chapter Two, where the significant role of education in alleviating poverty in Iraq is highlighted. Numerous theoretical contributions, including those by Becker and Tomes (1968), Solon (1999, 2002), and Black and Devereux (2010), have highlighted the significant influence of parental educational backgrounds on shaping the educational outcomes of subsequent generations. Scholars often use educational mobility between generations as a measure of equality of opportunity, highlighting the impact of parents' education on their children's educational achievements. By investigating intergenerational educational mobility, we can evaluate the elasticity or persistence of educational attainment between generations, providing meaningful guidance for policymakers seeking to enhance equality of opportunity. In Chapter Three, I will assess the trends of intergenerational educational mobility between parents and their descendants in Iraq and provide a comprehensive analysis of mobility patterns across national, regional, and gender dimensions. Additionally, through the use of decomposition methods similar to those proposed by Checchi, Fiorio, and Leonardi (2013), I will attempt to quantify the extent of inequality in opportunities arising from external factors, such as a child’s background or circumstances.

Iraq's history of conflict has led to the destruction of infrastructure, the weakening of institutions, and a complex socio-political landscape, all of which have adversely affected citizens' access to essential services. To support recovery and foster human development, it is critical to systematically monitor and evaluate key development indicators across the country's provinces. Furthermore, researchers often face considerable difficulties due to the absence of reliable and up-to-date data when examining various aspects of Iraqi society. Therefore, it is essential to develop alternative methodological approaches that are accessible and can effectively indicate the socioeconomic conditions across the country. In Chapter Three, I propose an innovative practical and precise method for evaluating human development by utilizing satellite-derived luminosity data. Drawing on the principles of New Economic Geography (NEG) theory as articulated by Paul Krugman, this framework posits that economic activities tend to concentrate in particular regions, resulting in agglomeration effects that stimulate growth and development (Krugman, 1991). In this chapter, I affirm that nighttime lights (NTL) reflect with aspects of human development, such as household wealth, education, and health. NTL data can offer a more responsive alternative to the Human Development Index (HDI), a widely utilized metric for assessing human development, by capturing real-time changes in economic activity and resilience, particularly in the face of sudden shocks. The HDI has faced criticism from scholars for its current methodology, which inadequately accounts for the impacts of sudden shocks and hazards on society, including the ongoing COVID-19 pandemic and environmental disasters such as tropical cyclones (Lashmar, 2018; Dey, Ray, & Majumder, 2022).

This thesis provides a comprehensive analysis of critical socio-economic issues in Iraq by examining family poverty, educational mobility, and human development through three interconnected studies, each contributing unique insights to the field. The first study explores

an in-depth analysis of the determinants of family poverty in Iraq through a multi-tiered classification approach that goes beyond the typical national-level focus found in previous studies. This layered approach yields a nuanced understanding of poverty determinants across classifications, equipping policymakers with targeted insights to design effective policies at national, regional, and sector-specific levels for supporting the most vulnerable groups.

Then, this thesis marks a pioneering endeavor to quantify and investigate intergenerational educational mobility in Iraq, filling a critical gap in the literature that has predominantly centered on mobility from fathers to their offspring. By incorporating a gendered perspective, this research uniquely examines the mobility trajectories of both mothers and fathers to their children, as well as the distinct patterns for sons and daughters. Furthermore, it offers a regional analysis of educational mobility across all Iraqi provinces, illuminating the nuanced regional variations in gender disparities. This multifaceted approach not only enriches the understanding of educational mobility in Iraq but also lays the groundwork for future research and policy interventions aimed at promoting equity in educational opportunities.

Researchers have previously used luminosity data to assess the impact of conflict on affected Iraqi provinces, interpreting reductions in light emissions as indicators of conflict-related disruptions (Li et al., 2018). By integrating NTL data with HDI, this thesis provides a pioneering methodology for analyzing human development at the provincial level–an approach particularly valuable for Iraq, where data collection is frequently challenged by conflict, political instability, and financial uncertainty. In addition, unlike previous studies that used lower-resolution DMSP-OLS data, this research substantially enhances the depth and accuracy of the analysis through the use of high-resolution VIIRS data.

2. THE DETERMINANTS OF FAMILY POVERTY IN IRAQ

2.1 Introduction

The eradication of extreme poverty, or at a minimum, halving the proportion of people living in poverty, is the first goal among the seventeen Sustainable Development Goals (SDGs) established by the United Nations in 2015. Poverty is a complex phenomenon that has been defined and understood in various ways by scholars. Despite these differing perspectives, a commonly shared perspective is that poverty arises when individuals cannot meet certain fundamental needs. According to World Bank (2000), "basic necessities of life include food, water, shelter, and clothing as well as inaccessibility to the social, cultural and means necessary to guarantee, productivity, social reproduction, and everyday life of the society".

The current situation of poverty in Iraq remains alarming, with a substantial portion of the population living below the poverty line. The Iraq Economic Monitor Report (2020) estimated that an additional 2.7 to 5.5 million Iraqis would be pushed into poverty due to the global oil market collapse during the COVID-19 pandemic, compounding the existing 6.9 million people already living in poverty. Efforts to combat poverty are multifaceted, encompassing direct strategies such as food provision, job creation, and income support for the impoverished, alongside indirect strategies like improving education, healthcare, and other essential public services. The Iraqi government has usually implemented direct actions to mitigate poverty through two primary social safety nets: food rations provided by the Public Distribution System (PDS) and targeted cash transfers via the Social Protection Net (SPN). Despite the significant annual budget dedicated to these programs, the number of families living at or near the poverty line remains persistently high. In addition, Iraq is one of the countries with the youngest populations globally, is experiencing a rapid annual

population growth of 2.4%. Children and young people make up a significant part of Iraq's demographic, with nearly 50% of the population under 19 years old and 60% below 25 years of age (World Bank, 2018). Consequently, a large share of the population enters the labor force. However, when the labor market, as is currently the case in Iraq, fails to absorb this influx and provide sufficient job opportunities, a large number of job seekers remain unemployed. As a result, the proportion of individuals and families experiencing in poverty increases.

Identifying and analyzing the determinants that influence family poverty is crucial for shaping effective governmental policies. Gaining such insights is critical for establishing a clear framework that guides policy interventions toward areas where poverty alleviation efforts need to be intensified. Moreover, given the regional disparities in poverty levels, examining the role of geographic factors is particularly important, as it enables the government to prioritize provinces that demand more focused attention. For instance, the political instability over the past two decades has likely had varying impacts across provinces, further influencing family poverty in different regions in Iraq. Additionally, examining poverty determinants by employment sector of the household head is vital for understanding how different types of employment shape poverty outcomes. Employment plays a critical role in determining income stability, earning potential, and overall economic security.

The objectives of this study go beyond simply assessing the determinants of family poverty across Iraq or differentiating between urban and rural households. It seeks to conduct a comparative analysis of the Kurdistan Region of Iraq (KRI) and the rest of Iraq (RI), recognizing that KRI, which encompasses Erbil, Sulaymaniyah, and Dohuk provinces, has its own government that operates independently from the central Iraqi government. This

differentiation is essential for developing targeted recommendations tailored to each governing body. Finally, this study attempts to examine the determinants of poverty based on the economic sector in which the household head is employed, specifically focusing on governmental, private, self-employed. Analyzing these determinants across various sectors enables a more targeted and nuanced understanding of poverty, facilitating the design of tailored interventions that effectively address the unique needs of individuals based on their employment status.

National-level findings on the determinants of family poverty reveal that higher educational attainment of the household head, female-headed households, access to food rations, employment of the household head in the government or through self-employment, and urban or KRI residency are all linked to a reduced likelihood of poverty. Conversely, larger family sizes, higher dependency ratios –where more non-working family members, such as children or the elderly, rely on fewer working members–, employment of the household head in the private or agricultural sectors, and rural residency are associated with an increased probability of family poverty. By categorizing Iraq into the KRI and the RI, the analysis highlights significant regional variations in the impact of poverty determinants. Education plays a less significant role in reducing poverty in KRI, where family size and dependency ratios also have a smaller impact. Government food rations effectively reduce poverty in KRI but not in RI. Although government and self-employment reduce poverty in both regions, their impact is greater in RI. Urban residency has a stronger effect on poverty reduction in RI, reflecting more challenging rural conditions in the rest of Iraq. Finally, the analysis explores the determinants of family poverty based on the economic sector of the household head's employment. The findings indicate that educational attainment is more effective in reducing poverty for households with heads employed in the government sector compared to

those with heads employed in the private sector. Family size and dependency ratio contribute more significantly to poverty among families with heads working in the private sector. Additionally, food distribution programs markedly reduce poverty for families with heads employed in the private sector.

The subsequent sections of this chapter are organized as follows: Section 2.2 presents a review of the relevant empirical literatures. Section 2.3 outlines the survey data and the methodology employed in the study. Section 2.4 provides a detailed discussion of the results, while Section 2.5 concludes the study with key findings and recommendations.

2.2 Literature Review

Understanding the determinants of poverty is essential for developing effective policies and interventions aimed at poverty alleviation. Researchers have consistently identified education as a fundamental driver of increased employee productivity and access to higher-quality employment, resulting in improved income levels. Although the degree of impact varies, a vast body of literature consistently reinforces the essential role education plays in alleviating poverty such as (Serumaga-Zake & Naudé, 2002; Okunola and Ojo, 2019; Abaidoo, 2021; Jula and Beriso, 2023). They emphasize the critical role of education as a key determinant of household welfare, confirming a significant negative correlation between education and poverty. Their findings suggest that higher levels of education, substantially reduce the likelihood of experiencing poverty.

The gender of the family head is an important determinant of family poverty. While female-headed families are perceived to be poorer than male-headed families, some studies suggest that they may experience lower poverty rates in certain contexts, due to external support systems. Zhang et al. (2024) argue that female-headed households do not show a consistent

pattern of vulnerability compared to male-headed households. Their research suggests that in countries where female heads of households have greater autonomy and access to income-generating resources, such as microfinance and social programs, poverty rates may be lower than those of male-headed households.

Family size is another key determinant of poverty, and the relationship between the two has attracted significant interest from both policymakers and researchers. The majority of studies indicate that poverty is more prevalent in larger families, with a strong correlation between larger household sizes and a higher likelihood of experiencing poverty (Meenakshi & Ray, 2002; Serumaga-Zake & Naudé, 2002; Mukherjee & Benson, 2003; Okunola & Ojo, 2019; Mohanty & Swain, 2019; Shaukat, Javed, & Imran, 2020; Abaidoo, 2021; Jula & Beriso, 2023). Alongside family size, the dependency ratio is a crucial factor influencing family poverty. It represents the proportion of non-working family members compared to the total household size. The majority of studies indicate that a high dependency ratio is strongly associated with a greater incidence of poverty (Akerele, Momoh, Adewuyi, Phillip, & Ashaolu, 2012; Shaukat, Javed, & Imran, 2020; Jula & Beriso, 2023).

One of the fundamental determinants of family poverty is the employment status of the household head, including whether they are employed or unemployed and the sector in which they work. Research shows that households with an employed head are less likely to experience poverty compared to those with an unemployed head (Abaidoo, 2021). While this is an expected finding, a more nuanced analysis can be achieved by examining poverty in relation to the specific economic sector or occupation of the household head. Akerele, Momoh, Adewuyi, Phillip, and Ashaolu (2012) highlight that poverty tends to be more severe among households where the head, who is the primary income earner, receives a salary or wage, as opposed to those led by non-salaried earners. Limited studies have examined the

determinants of poverty through the lens of the economic sector in which the household head works, an area that is crucial to understanding the nuanced factors that influence household poverty.

Although national-level analysis provides a comprehensive overview, examining poverty across different classifications yields a deeper insight into its underlying drivers. This method facilitates the development of more targeted and inclusive poverty reduction strategies. For instance, Mohanty & Swain (2019) examine poverty determinants in rural Odisha, India, for various social groups, including Scheduled Castes, Scheduled Tribes, Other Backward Classes, and others. Their findings reveal that family size, the proportion of monthly per capita expenditure allocated to food, and the choice of energy sources for lighting significantly influence poverty across all groups. Furthermore, rural poverty is particularly shaped by the education level, gender, and age of the family head (Mohanty & Swain, 2019). Gioachin, Marx, & Scherer (2023) find that social class continues to affect relative poverty, with upper-class jobs remaining secure, middle-class jobs experiencing a slight rise in risk, and working-class jobs seeing the highest increase in poverty risk. Analyzing data from Italy, Spain, France, and the UK, they show that class-based poverty stratification persists, with regional variations, particularly higher risks for less advantaged classes in Southern Europe due to single-earner households. He, Wu, Webster, and Liu (2010) investigate poverty in China, focusing on low-income neighborhoods and diverse social groups. Their research identifies three distinct neighborhood types: deteriorating inner-city zones, declining workers' settlements, and urban villages. The population studied includes working individuals, laid-off or unemployed persons, retired urban residents, and rural migrants. The findings highlight that poverty is most severe in deteriorating inner-city areas and among the laid-off and unemployed, revealing a disparity between actual hardships and the allocation

of social welfare. In their study, Özpinar and Akdede (2022) examined the factors influencing perceptions of poverty through a survey involving 1,110 individuals from Turkey's three largest cities: Istanbul, Ankara, and Izmir. The study reveals that participants with higher levels of education predominantly attribute poverty to structural causes, while those with lower educational attainment are more inclined to associate it with fatalistic explanations.

While many studies provide broad analyses of poverty determinants, limited investigations specifically address the nuanced variations in poverty outcomes based on different classification. To effectively identify the groups most vulnerable to poverty, it is essential to not only examine poverty at the national level but also to categorize society into distinct segments. These categories may vary across different contexts and should be tailored to the specific socio-economic landscape of the country. Such categorization provides policymakers with valuable insights to efficiently identify and address the needs of the most vulnerable populations. In this study, I will first examine a wide range of poverty determinants at the national level, followed by a focused analysis of urban and rural areas. Additionally, I will classify Iraq into the Kurdistan Region of Iraq (KRI) and the Rest of Iraq (RI) to analyze the determinants of poverty in each region separately. Finally, I will categorize the study sample based on the economic sector in which the household head is employed and conduct estimations to identify the determinants of poverty accordingly. I will elaborate on the rationale for these categorizations in the methodology section.

2.3 Data and Methodology

2.3.1 Data

This study utilizes the second round Iraq Household Socio-Economic Survey (IHSES 2012) as the last survey of a similar nature have been conducted since that time. The data for this

survey were collected between 2012 and 2013 and were first published in August 2015. This survey offers comprehensive data on various aspects of Iraqi families, including their age, gender, educational attainment, employment status, family expenditure, and other demographic or personal attributes. The data collected serves as a crucial resource for understanding regional disparities and formulating targeted policies to address socio-economic issues across different areas. The data collected from 118 districts across all 18 provinces in Iraq. The survey developed collaboratively by Iraqi government statistical institutions with support from the World Bank (COSIT & KRSO, 2015).

2.3.2 Methodology

This study employs logistic regression analysis to determine various factors contributing to poverty at the family level. Binary logistic regression is commonly utilized to assess the impact of explanatory variables on the likelihood of a family being poor (Shirazi, 1995; Achia, Wangombe, & Khadioli, 2010; Rahman, 2013; Makame & Mzee, 2014; Bilenkisi, Gungor, & Tapsin, 2015; Majumder & Biswas, 2017; Borko, 2017; Mohanty & Swain, 2019; Rozanti, Khusaini, & Prasetyia, 2021; Abaidoo, 2021; Jula & Beriso, 2023). The dependent variable is binary, with 1 representing a poor family and 0 representing a non-poor family.

The poverty line serves as a threshold for representing the minimum level of income, expenditure, or consumption required to meet basic needs. People living below this line are considered poor, as they lack sufficient resources to fulfill essential needs and maintain a basic standard of living (Akerele, Momoh, Adewuyi, Phillip, & Ashaolu, 2012; Manjengwa, Matema, & Tirivanhu, 2016; Jula & Beriso, 2023). In developing countries, income reporting is frequently unreliable, as respondents may underreport their earnings due to concerns about taxation or concealing illicit income. Moreover, income-based poverty measures are susceptible to distortion from seasonal income variations. As a more reliable alternative,

consumption expenditure is typically more stable and offers a more accurate reflection of long-term economic conditions (Shaukat, Javed, & Imran, 2020). Serumaga-Zake and Naudé (2002) state that compared to income-based measures, consumption-based welfare assessments are often preferred, particularly because accurately measuring income–especially among the self-employed–presents greater challenges than evaluating consumption patterns.

I utilized the concept of absolute poverty line to classify families as either poor or non-poor. Absolute poverty measurement offers several advantages over relative poverty assessments. In developing countries, where many people struggle to meet basic necessities, prioritizing absolute poverty is vital for analyzing poverty determinants and significantly improving overall well-being and survival. Absolute poverty is often explored in empirical research, particularly in studies focusing on developing countries, poverty assessments, international comparisons, and analyses across time periods (World Bank, 2018). By establishing a clear and consistent standard based on a fixed threshold, absolute poverty allows for direct comparisons across countries and regions. Moreover, the simplicity of the measurement allows for efficient data collection and analysis (World Bank, 2022). Iraq employs an "absolute" poverty line, which establishes a fixed welfare threshold based on the cost of basic needs (CBN) approach. In this framework, the poverty line is defined as the level of expenditure necessary for households to meet both their food and non-food basic needs. Specifically, the CBN approach in Iraq calculates the poverty line by determining the expenditure required to achieve a specified caloric intake and to satisfy essential non-food needs. The overall poverty line is thus derived by combining the food poverty line with the non-food poverty line (World Bank, 2017). The absolute poverty line for Iraq, established by the Iraqi Ministry of Planning in collaboration with World Bank experts, was set at 105,000

Iraqi Dinars in 2012, representing the average per capita expenditure (Sharma & Wai-Poi , 2019). A family is considered poor if its average per capita expenditure falls below this threshold.

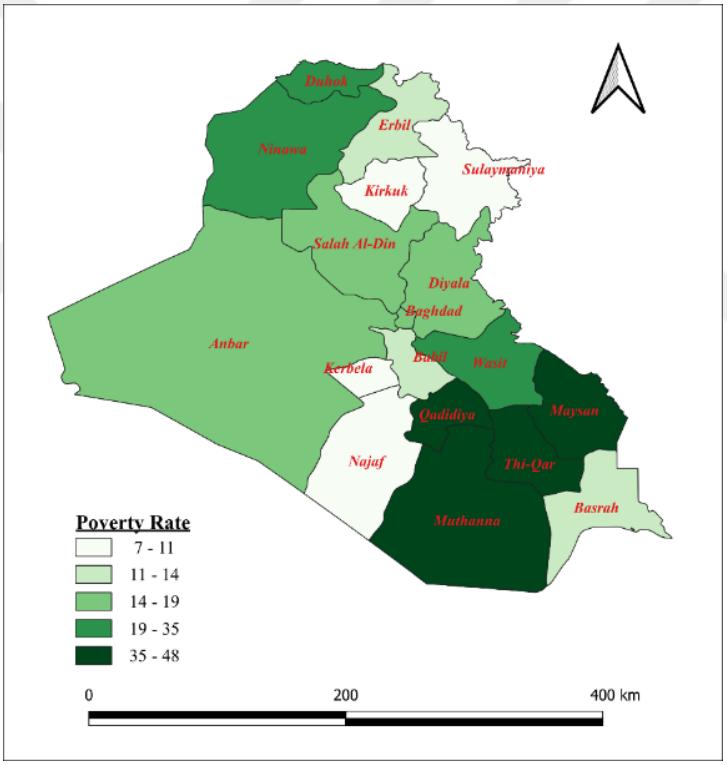
To investigate the determinants and their varying impacts on family poverty, I performed multiple estimations based on different classifications of the sample. Initially, I analyzed data for the entire nation, followed by separate evaluations for urban and rural areas. Subsequently, I performed estimations based on the Kurdistan Region of Iraq (KRI) and the rest of Iraq (RI), acknowledging KRI's distinct governance and its inclusion of three provinces –Erbil, Sulaymaniyah, and Dohuk[1]. International reports highlight notable disparities in poverty rates, educational enrollment, and development between KRI and the RI (World Bank, 2011; UNICEF, 2020; World Bank, 2020). This differential analysis may be crucial for formulating targeted recommendations for each governing entity. According to the IHSES 2012 data, the overall poverty headcount rate in Iraq stands at 19.82%. However, when disaggregated by region, the average rate is 12.35% in the KRI and 22.01% in the RI. The variation in poverty headcount rates across provinces, illustrated in ***Figure 2.1***, shows that poverty rates are significantly lower in Sulaymaniyah, Kirkuk, Kerbala and Najaf. In contrast, the highest poverty levels are found in the southern provinces, notably Qadisiyah, Maysan, Thi-Qar, and Muthanna. Lastly, I assessed the factors influencing family poverty based on the economic sector in which the family head is employed[2]. Examining the determinants of poverty through the lens of the economic sector is critical in the case of Iraq,

1 The Kurdistan Region of Iraq (KRI), governed by the Kurdistan Regional Government (KRG), operates under its own parliamentary democracy, with Erbil as its capital. The region gained de facto autonomy following the 1991 Kurdish uprising against Saddam Hussein.

2 The utilized survey data categorizes employment into two primary categories: wage jobs (employed) and non-wage jobs (self-employed). Wage jobs are further divided into two groups: those employed in the government sector and those employed outside the government sector, referred to as the private sector.

where characterized by a large government sector and an underdeveloped private sector. In addition, the self-employment sector lacks adequate support and resources, making it difficult for individuals to achieve sustainable livelihoods. This unique economic structure creates a complex poverty landscape where understanding the interplay between these sectors is essential to developing targeted policy interventions that can effectively address the specific challenges facing households in Iraq.

Figure 2.1: **The poverty headcount rates across all Iraqi provinces (IHSES 2012)**



Based on an extensive review of the literature and considering the factors that may influence household poverty in Iraq, I have identified and selected fifteen explanatory variables for analysis. These variables, along with their definitions, are presented in the ***Table 2.1***.

Table 2.1: Explanation of variables

Variables	Explanation
Poverty	This dependent variable is binary, with a value of 1 representing poor family and a value of 0 indicating non-poor family.
Independent Variables	
Education	This categorical variable represents the highest level of education attained by the head of the family. The categories are as follows: Illiterate (set as the reference category), Primary School, Secondary School, High School, Diploma, and University or Higher Degree.
Gender	The gender of the family head is represented by a dummy variable, where 1 indicates female and 0 indicates male.
Age	Age of the family head, in years
Age squared	Squared Age of the family head, in years
Family size	The number of family members
Family size squared	The squared number of family members
Dependence ratio	Expressed as the percentage of family members who are either under 15 years old or over 64 years old relative to the total number of individuals in the family.
Housing ownership	A dummy variable indicating dwelling ownership status, where 1 indicates ownership by the family and 0 indicates non-ownership.
Rations	This dummy variable refers to a publicly subsidized food distribution program within the Public Distribution System (PDS), which provides fixed monthly allocations of essential commodities. Families receiving these ration items are coded as 1, while those not receiving them are coded as 0.
Employment status	This dummy variable indicates the employment status of the family head, where 1 denotes employed and 0 denotes unemployed.
Government sector	This dummy variable indicates whether the family head is employed in the governmental sector, with a value of 1 for employment in this sector and 0 for employment in private sector.
Self employed	This dummy variable indicates whether the family head is engaged in self-employment (non-waged job), with a value of 1 representing self-employment and 0 indicating employment in governmental or private sectors (waged job).
Agriculture sector	This dummy variable indicates whether the family head is employed in the agriculture sector, with a value of 1 for employment in this sector and 0 for employment outside of it.
Area	Family location is represented by a dummy variable, with a value of 1 indicating an urban area and 0 indicating a rural area.
Province	This categorical variable represents the provinces in which the family resides, with Baghdad, as the capital of Iraq, serving as the reference category.

Table 2.2: Descriptive statistics

Variables	Category/Measure	Value/%
Education	Illiterate	30.26
	Primary School	34.90
	Secondary School	10.62
	High School	8.18
	Institute	8.60
	University or Higher Degree	7.45
Gender	Male	94.06
	Female	5.94
Age	Mean	43.63
	Standard Deviation	12.05
Family size	Mean	6.95
	Standard Deviation	3.35
Dependence ratio	Mean	1.10
	Standard Deviation	.88
Housing ownership	Own	74.99
	Not Own	25.01
Rations	Received	98.45
	Not Received	1.55
Employment status	Employed	75.84
	Unemployed	24.16
Government sector	Government Sector	47.43
	Private Sector	52.57
Self employed	Self Employed	35.71
	Waged Employed	64.29
Agriculture sector	Agriculture Sector	15.30
	Not Agriculture Sector	84.70
Area	Urban	61.69
	Rural	38.31
Province	Duhok	4.91
	Nainawa	7.17
	Sulaimaniya	11.90
	Kirkuk	3.39
	Erbil	6.72
	Diyala	5.69
	Anbar	7.26
	Baghdad	9.38
	Babylon	3.84
	Kerbala	2.68
	Wasit	5.17
	Salah Al-Deen	7.27
	Najaf	2.65
	Qadisia	3.26
	Muthanna	2.93
	Thi-Qar	4.55
	Maysan	4.67
	Basrah	6.55

Table 2.2 presents the demographic characteristics of the families that participated in the survey. The educational distribution of household heads indicates that the largest proportions are illiterate (30.26%) and have completed primary education (34.90%). In contrast, 10.62%, 8.18%, 8.60%, and 7.45% of family heads have attained secondary, high school, institute, and university or higher education, respectively. Regarding the gender distribution of family heads, 94.06% are male, while 5.94% are female. The average age of family heads is 43.63 years, with an average family size of 6.95 members and a dependency ratio of 1.10. Additionally, 74.99% of families own their homes, whereas 25.01% do not. Nearly all families receive government-provided rations, with 98.45% receiving them, and only 1.55% not receiving any. In terms of employment, 75.84% of family heads are employed, while 24.16% are unemployed. Notably, some family heads hold multiple jobs across different sectors. Among wage earners, 47.47% are employed in the governmental sector, and 52.53% in the private sector. Furthermore, 35.71% of family heads are self-employed or work in non-wage jobs, while 64.29% are wage earners. A small percentage (15.3%) of families are engaged in the agricultural sector, whereas 84.70% work outside this sector. The table also highlights that 61.69% of the sample families reside in urban areas, with 38.31% in rural regions. Finally, ***Table 2.2*** also illustrates the regional distribution of sample families across all provinces.

2.4 Results and Discussion

2.4.1 Determinants of Family Poverty Across the Nation

The results of the national estimation are presented in ***Table 2.3***. The first two columns display the findings for the entire country, while the subsequent columns present separate estimations for families residing in urban and rural areas. For each category, two different

estimations were conducted. The first estimation used a broad employment status variable, indicating whether the household head was employed, allowing for a larger sample size. The second estimation included more detailed variables specifying the employment sector of the family head, which led to a smaller sample size. This approach may ensure both robustness and detail in the analysis.

The findings suggest that education contribute to reducing the likelihood of a family experiencing poverty. As shown in the second column of ***Table 2.3***, families headed by individuals with a university education or higher are 13.6% less likely to experience poverty compared to those with no education. In contrast, families headed by individuals with only a primary education are 3.9% less likely to be poor. Similarly, Abaidoo (2021) explores that higher education levels, particularly tertiary education, greatly reduce the likelihood of poverty in Ghana. In addition, Bilenkisi, Gungor, & Tapsin (2015) examine the relationship between household heads' education levels and household poverty risk in Turkey using logistic regression models. The findings reveal a negative correlation between the education level of household heads and the likelihood of poverty, indicating that higher education reduces poverty risk. Majeed & Malik (2015) also identify that poverty is most acute among households with lower levels of education and diminishes as educational attainment increases, from primary to higher education.

It is important to note that, while educational attainment does play a role in alleviating poverty, its impact is less pronounced in comparison to other countries. This observation aligns with the findings of Tzannatos, Diwan, & Abdel Ahad, (2024), who explored the effect of education on household income across 162 countries. Their analysis indicates that the impact of education is particularly diminished in conflict-affected countries such as Iraq and Syria. Based on the findings of this study, in the Middle East, an additional year of education

is associated with an average income increase of 4.2% for males and 5.1% for females. In contrast, they report that in Iraq, the impact is notably lower, resulting in only a 2.6% increase for males and a 3.1% increase for females. Iraq's low education enrollment rates stem from decades of inadequate public funding, which led to deteriorated infrastructure, outdated curricula, and poor teacher training. Despite increased spending since 2006, current expenditure remains well below late 1980s levels and is largely focused on salaries rather than improving educational resources. The education budget is still only one-third of the regional average, exacerbating systemic challenges. The low quality of the educational system is reflected in the minimal returns to education, as indicated by the limited increase in earnings attributed to additional years of schooling. When controlling for other factors, the average hourly earnings of a wage earner increase by only up to 2.6 percent per additional year of schooling (World Bank, 2011). In comparison, international averages for returns to education are approximately 6 percent (Harmon, Oosterbeek, & Walker, 2000).

The effect of educational attainment by the family head is substantially more pronounced in rural areas than in urban areas, especially at higher levels of education, as shown in columns three to six of ***Table 2.3***. Specifically, in rural areas, families headed by individuals with a university degree or higher are 16% less likely to be impoverished compared to those with no education. In contrast, in urban areas, the likelihood of poverty is reduced by 11.4% for families headed by individuals with a university degree or higher. Similar to the findings of the current study, Shaukat, Javed, and Imran (2020) illustrate that the influence of family characteristics on poverty in Pakistan varies significantly based on the area of residence, distinguishing between rural and urban settings. However, unlike the current study, they found that education plays a more pronounced role in reducing poverty in urban areas compared to rural ones. According to Serumaga-Zake and Naudé (2002), education holds

equal significance in reducing family poverty in both urban and rural areas of South Africa's Northwest Province, which contrasts with the findings of this study. In the case of Iraq, rural areas typically have lower average education levels and less developed educational infrastructure. Consequently, improving educational attainment in these areas can significantly reduce poverty, as the economic benefits of higher education are more pronounced due to the limited resources and opportunities. In contrast, urban areas, with better educational infrastructure and higher baseline education levels, may see a less dramatic impact from increased education on poverty reduction.

Table 2.3: Determinants of family poverty by the nation and residential area

Determinants of Family Poverty	Nation (I)	Nation (II)	Urban (III)	Urban (IV)	Rural (V)	Rural (VI)
Education						
Primary	-0.045*** (0.006)	-0.039*** (0.007)	-0.041*** (0.007)	-0.032*** (0.008)	-0.052*** (0.011)	-0.049*** (0.012)
Secondary	-0.080*** (0.008)	-0.069*** (0.009)	-0.071*** (0.009)	-0.062*** (0.010)	-0.092*** (0.016)	-0.078*** (0.017)
High School	-0.100*** (0.009)	-0.092*** (0.009)	-0.091*** (0.009)	-0.081*** (0.010)	-0.108*** (0.018)	-0.105*** (0.019)
Diploma	-0.120*** (0.008)	-0.101*** (0.009)	-0.100*** (0.009)	-0.085*** (0.010)	-0.147*** (0.017)	-0.124*** (0.019)
University or Higher	-0.152*** (0.008)	-0.136*** (0.009)	-0.126*** (0.008)	-0.114*** (0.009)	-0.189*** (0.018)	-0.160*** (0.020)
Gender	-0.038** (0.011)	0.023 (0.023)	-0.027* (0.011)	0.026 (0.024)	-0.066** (0.024)	0.005 (0.048)
Age	0.004** (0.001)	0.006** (0.002)	0.005** (0.002)	0.010*** (0.002)	0.003 (0.002)	0.005 (0.003)
Age Squared	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	-0.000* (0.000)	-0.000 (0.000)
Family Size	0.058*** (0.002)	0.057*** (0.003)	0.054*** (0.003)	0.055*** (0.004)	0.063*** (0.004)	0.060*** (0.005)
Family Size Squared	-0.002*** (0.000)	-0.002*** (0.000)	-0.002*** (0.000)	-0.002*** (0.000)	-0.002*** (0.000)	-0.002*** (0.000)
Dependence Ratio	0.038*** (0.002)	0.039*** (0.003)	0.030*** (0.003)	0.030*** (0.003)	0.051*** (0.004)	0.055*** (0.005)
Housing Ownership	-0.023*** (0.005)	-0.016** (0.006)	-0.023*** (0.006)	-0.015** (0.006)	-0.016 (0.012)	-0.013 (0.012)
Rations	-0.031 (0.024)	-0.034 (0.024)	-0.066** (0.020)	-0.067** (0.019)	0.129 (0.075)	0.180 (0.097)
Employment Status	-0.031*** (0.006)	-	-0.033*** (0.006)	-	-0.029* (0.011)	-
Government Sector	-	-0.054*** (0.006)	-	-0.040*** (0.006)	-	-0.076*** (0.011)
Self Employed	-	-0.071*** (0.007)	-	-0.065*** (0.007)	-	-0.075*** (0.014)

Agriculture Sector	-	0.036*** (0.008)	-	0.021 (0.014)	-	0.036** (0.014)
Area	-0.049*** (0.005)	-0.047*** (0.005)	-	-	-	-
Provinces						
Duhok	-0.104*** (0.009)	-0.090*** (0.010)	-0.077*** (0.008)	-0.058*** (0.009)	-0.149*** (0.023)	-0.150*** (0.025)
Nainawa	0.059*** (0.012)	0.063*** (0.013)	0.066*** (0.014)	0.070*** (0.014)	0.046 (0.024)	0.035 (0.026)
Sulaimaniya	-0.075*** (0.010)	-0.060*** (0.011)	-0.065*** (0.009)	-0.043*** (0.010)	-0.098*** (0.024)	-0.102*** (0.025)
Kirkuk	-0.048*** (0.013)	-0.042** (0.014)	-0.032* (0.016)	-0.021 (0.016)	-0.081** (0.026)	-0.090** (0.027)
Erbil	-0.083*** (0.011)	-0.064*** (0.012)	-0.053*** (0.010)	-0.032** (0.011)	-0.140*** (0.024)	-0.128*** (0.027)
Diyala	0.138*** (0.015)	0.115*** (0.016)	0.162*** (0.020)	0.153*** (0.022)	0.125*** (0.027)	0.080** (0.029)
Anbar	-0.058*** (0.010)	-0.060*** (0.011)	-0.047*** (0.010)	-0.036*** (0.010)	-0.083*** (0.024)	-0.111*** (0.025)
Babylon	-0.017 (0.013)	-0.003 (0.015)	0.007 (0.017)	0.028 (0.019)	-0.051* (0.026)	-0.052 (0.028)
Kerbala	0.030 (0.017)	0.016 (0.017)	0.050* (0.021)	0.049* (0.021)	0.004 (0.031)	-0.037 (0.033)
Wasit	0.026* (0.013)	0.039** (0.014)	0.039** (0.015)	0.066*** (0.016)	0.007 (0.026)	-0.006 (0.028)
Salah Al-Deen	-0.021 (0.011)	-0.014 (0.012)	-0.009 (0.012)	0.002 (0.013)	-0.050* (0.023)	-0.056* (0.025)
Najaf	-0.056*** (0.013)	-0.044** (0.015)	-0.031* (0.014)	-0.017 (0.015)	-0.099** (0.028)	-0.096** (0.031)
Qadisia	0.214*** (0.018)	0.213*** (0.019)	0.163*** (0.020)	0.165*** (0.021)	0.290*** (0.033)	0.272*** (0.036)
Muthanna	0.192*** (0.018)	0.204*** (0.021)	0.192*** (0.022)	0.202*** (0.024)	0.191*** (0.033)	0.195*** (0.037)
Thi-Qar	0.187*** (0.015)	0.185*** (0.017)	0.143*** (0.016)	0.145*** (0.018)	0.251*** (0.031)	0.239*** (0.035)
Maysan	0.176*** (0.015)	0.167*** (0.016)	0.125*** (0.016)	0.122*** (0.016)	0.259*** (0.031)	0.229*** (0.033)
Basrah	-0.012 (0.012)	-0.002 (0.013)	-0.008 (0.011)	0.010 (0.011)	-0.026 (0.028)	-0.040 (0.030)
Chi-square	4828.36***	4080.55***	2574.85***	2156.02***	1857.57***	1626.85***
Pseudo R-squared	0.278	0.293	0.302	0.326	0.223	0.237
Number of Observations	19949	16417	12298	9955	7651	6462

Note: The standard errors are within the parenthesis. *** p<.001, ** p<.01, * p<.05

The gender of the family head is another determinant of poverty in Iraq, with female-headed households being less likely to experience poverty. However, the extent of this effect varies between rural and urban areas. In rural regions, female-headed families are 6.6% less likely to be poor, whereas in urban areas, the likelihood is reduced by only 2.7%. The findings are consistent with the study by Shaukat, Javed, and Imran (2020), which examined how

household characteristics influence poverty, with particular sensitivity to the area of residence—rural or urban—in Pakistan. The study found that in rural areas, male-headed households are 2.9 times more likely to experience poor wealth status compared to female-headed families. In urban areas, male-headed households have a 1.8 times higher likelihood of being classified as having poor wealth status. However, the findings of the current study concerning the gender of the family head stand in contrast to the results of most previous studies, which have identified female-headed households as being particularly vulnerable to poverty (Ebrahim Pour & Mila elmi, 2013; Limanlı, 2015; Al Lily and Waibel, 2021).

The literature highlights the age of the family head as a critical demographic factor in poverty analysis. The results show that as the family head ages, the probability of experiencing poverty rises. Additionally, households with larger family sizes are more likely to experience poverty, with an increased probability of 5.5% in urban areas and 6% in rural areas. However, the squared term for family size indicates that beyond a certain point, the marginal effect of further increases in family size diminishes. Abaidoo (2021) explores that poverty is more prevalent among household heads in rural areas and those with larger family sizes. In addition, Al Lily & Waibel (2021) highlight that the prevalence of large family sizes, coupled with the cultural norm of a single income earner, exacerbates the likelihood of households falling into poverty. The diminishing marginal effect of family size in larger families and reducing the likelihood of poverty among households headed by women may be partly due to Iraq's social protection scheme. At the onset of the 2003 war, the Iraqi government extended this program to include households with unemployed heads. In January 2005, the government began providing monthly grants to beneficiaries, with the amount determined by and increasing according to the number of family members. The scheme also encompassed

widows, divorced women, and other vulnerable groups, further contributing to the reduction in poverty rates within these demographics (Ibrahim & Husain, 2009).

The results indicate that as the dependency ratio increases by one unit, ceteris paribus, the likelihood of a household escaping poverty decreases by approximately 4%. Limanlı (2015) and Shaukat, Javed , & Imran (2020) identify a strong correlation between the dependency ratio and poverty status in Turkey and Pakistan, respectively. Their findings suggest that households with a higher number of dependents are more prone to poverty, as these dependents do not contribute to the household's income. This outcome may be attributed to the diminished household resources available to support each dependent, which negatively affects overall household consumption (Jula & Beriso, 2023). Furthermore, the impact of the dependency ratio is considerably more pronounced in rural areas than in urban areas. The study's findings on dependency ratios have important policy implications. Higher dependency ratios, with more children and older adults as dependents, place a greater financial burden on families and limit their ability to escape poverty. Policymakers should consider expanding access to affordable childcare, such as public kindergartens, to ease the pressure on working parents. Similarly, expanding elder care services, such as affordable nursing homes, would ease the care burden on families.

The results from the whole sample suggest that households that own their home are less likely to experience poverty, with no significant difference between urban and rural households concerning these two factors. Homeownership plays a role in alleviating poverty; however, the quality of housing for Iraqi families is generally perceived as substandard. A significant proportion of Iraqi households report inadequate living space and insufficient utilities. Approximately 51 percent of Iraqi households reside in overcrowded conditions, which is higher than the 33 percent in Iran, and markedly the 1 percent in Jordan. On average,

households have only one bedroom for every three to four members, underscoring the cramped and inadequate housing conditions faced by many (World Bank, 2011; World Bank, 2017).

Although the overall impact of food rations provided through Iraq's Public Distribution System (PDS) on poverty reduction is not statistically significant for the entire sample, notable differences are observed between urban and rural areas. In urban areas, households receiving food rations are 6.7% less likely to experience poverty, whereas this effect is not statistically significant in rural areas. A significant portion of the government's annual budget is allocated to the PDS program. However, despite this considerable expenditure, the PDS remains highly inefficient, as highlighted in the World Bank's 2018 annual report (World Bank, 2018). The PDS program was initially launched in the 1990s during the period of international sanctions on Iraq, when the majority of Iraqi households were in need of assistance. However, in the context of contemporary Iraq, the programme requires updating to better address current socio-economic realities. To improve the effectiveness of food rations, this study recommend that the government move from a universal distribution model to a more targeted approach. By focusing resources on families living below the poverty line, the program can allocate greater support to those most in need.

Research, including the present one, have consistently shown that the employment status of the household head is a crucial determinant of family poverty. Studies have found that households with an unemployed head face a significantly higher probability of falling into poverty, as the absence of income from the head of the household exacerbates economic vulnerability. This finding is supported by various studies across different contexts, including those by Limanlı (2015), Al Lily and Waibel (2021), Datt and Jolliffe (1999), and Bilenkisi, Gungor, and Tapsin (2015), all of which highlight the strong link between unemployment

and increased poverty risk. The results from the second column of ***Table 2.3*** indicate that households with heads employed in the government sector or self-employed are less likely to experience poverty. Families headed by self-employed individuals running their own businesses are 7.1% less likely to experience poverty, compared to a 5.4% lower likelihood for those employed in the government sector. In contrast, households headed by individuals working in the agricultural sector are 3.6% more likely to experience poverty. The findings of Geda, Jong, Mwabu, and Kimenyi (2005) and Majeed and Malik (2015) align with this of the present study, regarding the relationship between agricultural employment and an increased risk of poverty among household heads in Kenya and Pakistan, respectively. Governmental sector jobs are generally considered more favorable than private sector positions in terms of wages, benefits, and working conditions. Earnings among public sector employees have risen disproportionately compared to their private sector peers. In Iraq, the private sector plays a limited role in poverty reduction due to its underdevelopment and a range of significant challenges, including high business costs, unreliable power supply, corruption, limited access to finance and land, and competition from state-owned enterprises and the informal sector. Decades of socialist economic policies –while not purely traditional in nature– have tightly linked Iraq's economy to the state, resulting in a private sector that remains small, informal, and concentrated in less impactful industries. These obstacles have stifled the growth of the private sector, severely restricting its capacity to contribute meaningfully to poverty alleviation (World Bank, 2012). Consequently, the public sector is relatively large in Iraq, employing over one-third of the workforce, compared to 21.3 percent in OECD countries. Additionally, the challenging business environment further hampers private sector development, with Iraq ranked 171 out of 190 countries in the Ease of Doing Business Index (Sharma & Wai-Poi , 2019).

Moreover, the findings underscore that the influence of the family head's employment sector differs substantially between rural and urban areas, especially within the government sector. In rural areas, households headed by individuals working in the government sector are 7.6% less likely to fall into poverty, whereas in urban areas, the likelihood of poverty is reduced by only 4%. Canbay & Selim (2010), in a manner similar to the current study, analyze the factors influencing household poverty levels in Turkey, distinguishing between urban and rural areas, using a logit model. Based on their research in rural areas, poverty is lower among households with daily wage earners and self-employed heads than those with unemployed heads. Additionally, their findings corroborate the current study's observations that households engaged in agriculture have higher poverty levels than those in non-agricultural sectors, with this effect being less pronounced in urban areas. The findings of Ranathunga & Gibson (2014) are also consistent with those of the current study. Their investigation into micro-level factors influencing household poverty in Sri Lanka's rural sector, using Probit regression analysis, reveals that poverty reduction is significantly associated with the household head's employment in the public sector and engagement in non-agricultural activities. Conversely, their study indicates that families with a head employed in the private sector is more likely to experience poverty in the rural sector. Iraq’s rentier economy has expanded the public sector while hindering the development of other sectors. This limits employment opportunities outside government jobs, restricts economic diversification, and reduces opportunities in the self-employed private sector and the agricultural sector.

The results also reveal that being an urban resident, as opposed to a rural resident, significantly decreases the likelihood of being poor. Urban centers and densely populated areas may exhibit lower poverty rates but could still accommodate a substantial number of impoverished individuals due to their large populations. Conversely, regions with high

poverty rates often suffer from inadequate public services, underdeveloped infrastructure, and limited access to markets and commercial opportunities, which impedes economic mobility and access to essential resources (Vishwanath, Sharma, Krishnan, & Blankespoor, 2015). Moreover, opportunities in Iraq are unevenly distributed, as reflected by the Human Opportunity Index (HOI), which accounts for disparities in access to opportunities. Access to essential opportunities is significantly influenced by geographic location; children in rural and less developed areas are considerably less likely to access these opportunities compared to their counterparts in urban or more developed regions (Krishnan, Lara Ibarra, Narayan, Tiwari, & Vishwanath, 2016).

Furthermore, I analyze the determinants of household poverty in Iraq for each province, as presented in ***Table 2.3***. Baghdad, the capital of Iraq, is the reference point. The estimation results indicate that households residing in provinces within the KRI—specifically Duhok, Erbil, and Sulaymaniyah—have a significantly lower probability of experiencing poverty compared to other provinces. Conversely, households in southern provinces such as Qadisiyah, Muthanna, Thi-Qar, and Maysan face a significantly higher probability of poverty compared to other provinces. Moreover, the recent crises, including declining oil prices and ISIS-related violence, have exacerbated poverty disparities in Iraq. The Southern provinces, historically the country's poorest, have seen their poverty levels polarized with the emergence of new poverty-stricken areas heavily impacted by ISIS, such as Nineveh, Kirkuk, Diyala, Anbar, and Salah al-Din (Sharma & Wai-Poi, 2019; World Bank, 2020). Although poverty levels in the KRI were relatively favorable in 2012, the situation worsened substantially after 2014, primarily due to the impact of the ISIS conflict and the large-scale displacement of people from conflict-affected provinces to KRI. These events placed considerable strain on the region, causing the poverty rate to rise from 3.5 percent to 12.5 percent, largely due to

the influx of internally displaced persons (IDPs) (Sharma & Wai-Poi, 2019). Additionally, the Kurdistan Regional Government's decision to implement public sector wage cuts in response to the financial crisis, precipitated by the sharp decline in oil prices, is anticipated to further exacerbate poverty, particularly among public sector employees (World Bank, 2020; World Bank, 2018).

2.4.2 Determinants of Family Poverty Across the Regions

The estimation results in the ***Table 2.3*** indicate a geographically uneven distribution of poverty in Iraq, with the KRI showing substantially lower poverty rates than other provinces of the country. This relative prosperity in the KRI is attributed to its de facto independence since 1991, vibrant cross-border trade, and relative stability after 2003. These factors may contribute to higher school enrollment rates, lower unemployment, and better access to credit in the region (World Bank, 2011). Thus, dividing the estimation between the KRI and RI is justified due to significant socio-economic and political differences. By conducting separate estimations, the study can more accurately capture the unique factors driving poverty in each region, allowing for a more nuanced understanding of the localized impacts of broader national trends and policies.

Even though, the findings demonstrate that the education level of the head of family significantly mitigates the probability of family poverty across both regions, the effect of educational attainment on poverty reduction is markedly less pronounced in the KRI compared to the RI. Specifically, as presented in ***Table 2.4***, families in KRI led by individuals with a university education or higher are only 3.4% less likely to be impoverished compared to those with no education. In contrast, in the rest of Iraq, families headed by individuals with a similar level of education are 17.1% less likely to experience poverty. According to IHSES

2012, both gross and net enrollment rates drop significantly after primary school, except in the KRI, where gross enrollment rates exceed 100 percent even at the intermediate and secondary levels, the highest in the country. When the supply of individuals, particularly heads of families, with higher or specific levels of education increases, the return on education can diminish. This is due to the economic principle of diminishing marginal returns: as the number of educated individuals grows, especially in a region with limited job opportunities or economic development, the labor market may become saturated (Moretti, 2004).

Family size and dependency ratio are two additional determinants that reveal notable differences between the KRI and other Iraqi provinces. In KRI, an increase of one family member raises the probability of poverty by only 2.3%, whereas in the rest of Iraq, this likelihood increases by 6.9%. Similarly, a one-unit increase in the family dependency ratio in KRI results in a 1.8% higher probability of poverty, compared to a 4.6% increase in the rest of Iraq. A significant factor contributing to this disparity is the notably larger average family size in the rest of Iraq compared to KRI[3]. Regarding households receiving government-distributed food rations, the results indicate that this program significantly reduces poverty in the KRI, with families receiving food rations being 4.5% less likely to experience poverty. In contrast, the marginal effect of receiving food rations on poverty reduction is not statistically significant in the rest of Iraq. In the KRI, where poverty levels are relatively lower than in the RI, families generally have better economic conditions, allowing them to benefit from PDS support as a supplementary resource that enhances their overall welfare. Meanwhile, in RI where poverty is more severe, households might face more significant structural barriers that limit the effectiveness of PDS alone to lift families out of

[3] The IHSES 2012 survey reports an average family size of 6.1 in KRI and 7.5 in RI.

poverty. Additionally, logistical challenges in more impoverished areas may reduce the accessibility or quality of PDS distribution, further impacting its effectiveness in those regions. This discrepancy underscores a limitation of the PDS which is not effectively targeted toward the most vulnerable regions and families.

Table 2.4: Determinants of family poverty by regional classification

Determinants of Poverty	KRI (I)	KRI (II)	RI (III)	RI (IV)
Education				
Primary	-0.015* (0.006)	-0.013* (0.006)	-0.054*** (0.008)	-0.049*** (0.009)
Secondary	-0.016 (0.010)	-0.011 (0.011)	-0.099*** (0.010)	-0.089*** (0.011)
High School	-0.020 (0.012)	-0.016 (0.013)	-0.124*** (0.011)	-0.117*** (0.012)
Diploma	-0.031** (0.010)	-0.028** (0.011)	-0.147*** (0.011)	-0.127*** (0.012)
University or Higher	-0.035** (0.011)	-0.034** (0.012)	-0.187*** (0.010)	-0.171*** (0.012)
Gender	0.002 (0.018)	-0.013 (0.034)	-0.050*** (0.014)	0.033 (0.030)
Age	0.000 (0.002)	0.004 (0.002)	0.005** (0.002)	0.008** (0.002)
Age Squared	-0.000 (0.000)	-0.000 (0.000)	-0.000*** (0.000)	-0.000*** (0.000)
Family Size	0.024*** (0.005)	0.023*** (0.005)	0.069*** (0.003)	0.069*** (0.003)
Family Size Squared	-0.001** (0.000)	-0.001** (0.000)	-0.002*** (0.000)	-0.002*** (0.000)
Dependence Ratio	0.018*** (0.003)	0.018*** (0.003)	0.043*** (0.003)	0.046*** (0.004)
Housing Ownership	-0.010 (0.007)	-0.010 (0.007)	-0.027*** (0.007)	-0.017* (0.007)
Rations	-0.049* (0.021)	-0.045* (0.022)	-0.024 (0.030)	-0.026 (0.032)
Employment Status	0.006 (0.008)	-	-0.043*** (0.007)	-
Government Sector	-	-0.017** (0.006)	-	-0.067*** (0.007)
Self Employed	-	-0.046*** (0.010)	-	-0.082*** (0.009)
Agriculture Sector	-	0.036*** (0.010)	-	0.035** (0.010)
Area	-0.034*** (0.006)	-0.031*** (0.007)	-0.053*** (0.006)	-0.052*** (0.007)
Provinces				
Duhok	-0.015* (0.007)	-0.016* (0.007)	-	-
Sulaimaniya	0.003 (0.007)	0.000 (0.008)	-	-

Nainawa	-	-	0.062*** (0.013)	0.068*** (0.014)
Kirkuk	-	-	-0.049*** (0.014)	-0.044** (0.015)
Diyala	-	-	0.145*** (0.015)	0.125*** (0.017)
Anbar	-	-	-0.061*** (0.011)	-0.065*** (0.012)
Babylon	-	-	-0.016 (0.014)	-0.002 (0.016)
Kerbala	-	-	0.033 (0.018)	0.018 (0.019)
Wasit	-	-	0.028** (0.014)	0.042** (0.015)
Salah Al-Deen	-	-	-0.021 (0.012)	-0.014 (0.013)
Najaf	-	-	-0.058*** (0.014)	-0.048** (0.016)
Qadisia	-	-	0.221*** (0.018)	0.225*** (0.020)
Muthanna	-	-	0.198*** (0.019)	0.214*** (0.021)
Thi-Qar	-	-	0.194*** (0.016)	0.195*** (0.018)
Maysan	-	-	0.182*** (0.016)	0.178*** (0.017)
Basrah	-	-	-0.013 (0.012)	-0.003 (0.014)
Chi-square	257.07***	274.88***	3762.36***	3129.74***
Pseudo R-squared	0.172	0.200	0.250	0.264
Number of Observations	4681	4231	15268	12186

Note: The standard errors are within the parenthesis. *** p<.001, ** p<.01, * p<.05

The results demonstrate that households with heads employed in the government sector or engaged in self-employment are less likely to experience poverty compared to those whose heads are employed in the private sector or in wage-based jobs, across both regions, albeit to varying extents. In the KRI, families led by individuals have jobs in government sector or self-employment are 1.7% and 4.6% less likely to experience poverty, respectively. In contrast, in the rest of Iraq, the likelihood of poverty is reduced by 6.7% and 8.2% for similar employment categories. Furthermore, the results indicate that urban residency significantly reduces the likelihood of poverty in both regions. However, the impact of urban residence on poverty reduction appears to be more pronounced in the rest of Iraq compared to the KRI. Specifically, residing in an urban area decreases the probability of poverty by 3.1% in KRI,

whereas in the rest of Iraq, the reduction is more substantial at 5.2%. This suggests that the conditions for rural residents may be more adverse in the rest of Iraq than in KRI.

2.4.3 Determinants of Family Poverty Across the Employment Sectors

Examining determinants of family poverty by employment sector classification is vital for uncovering the specific impacts that different types of employment have on poverty levels. Occupation plays a significant role in determining income stability, earning potential, and overall economic security. By analyzing poverty determinants across various sector of employment, researchers can identify specific vulnerabilities and disparities associated with different types of employment. The utilized survey data categorizes employment into two primary categories: wage jobs (employed) and non-wage jobs (self-employed). Wage jobs are further divided into two groups: those employed in the government sector and those employed outside the government sector, referred to as the private sector. Rather than estimating only two broad groups—wage and non-wage jobs—I aimed to compare all three: government sector, private sector, and self-employed. In addition, I conducted a separate estimation for families with heads holding more than one job. This approach allows for a more targeted assessment of poverty alleviation strategies, facilitating more effective policy interventions tailored to the needs of individuals based on their occupational status (Goedemé, Nolan, Paskov, & Weisstanner, 2022; Fields, 2012).

The estimation results presented in the ***Table 2.5*** reveal that educational attainment within a household significantly reduces the likelihood of poverty across all employment sectors. Higher education of head of family has a greater impact on reducing family poverty in the governmental sector compared to the private sector due to better job security, higher wages, structured career progression, and additional benefits such as pensions. Public sector jobs often provide more stability and financial support, which helps families maintain consistent

income levels. In contrast, the private sector can be more volatile and less likely to offer comparable benefits or job security, limiting the poverty-reducing effect of higher education (Montenegro & Patrinos, 2022).

Additionally, family size and dependence ratio emerge as a significant determinant with varying effects across different employment sectors. Specifically, family size has a considerable impact on increasing the probability of poverty for families headed by individuals in the private sector, whereas its influence is less pronounced for families with heads working in multiple jobs. Moreover, the dependency ratio notably increases the probability of poverty for households headed by individuals employed in the private sector. Conversely, its effect is less significant for households led by individuals in the governmental sector. The results demonstrate that urban residency significantly reduces the likelihood of poverty across all employment sector category. Additionally, consistent with findings from the overall sample estimation, households residing in the KRI exhibit a substantially lower probability of poverty compared to those in other provinces, particularly among families whose heads hold multiple jobs. Conversely, households in southern provinces face a markedly higher probability of poverty across all employment sectors.

A key finding from the estimation by employment sector classification is the substantial impact of the food distribution program on households headed by individuals employed in the private sector. Specifically, families receiving food rations are 16.4% less likely to experience poverty when the household head works in the private sector. In contrast, the marginal effects of this program are not statistically significant for other employment sectors. Families headed by private sector workers tend to have larger family sizes or higher dependency ratios, as reflected in the results in ***Table 2.5***, which increases their vulnerability to poverty compared to other sectors of work. In addition, private sector employment

generally provides less income stability and fewer benefits than government and self-employed jobs, making households more vulnerable to economic hardship. These factors amplify the impact of the food ration program for families with a private sector head, as it helps ease the financial burden associated with supporting a larger family.

Table 2.5: Determinants of family poverty by employment sector of family head

Determinants of Poverty	Government	Private	Self-employed	Multi-job head
Education				
Primary	-0.038** (0.012)	-0.036* (0.015)	-0.053*** (0.013)	-0.037* (0.016)
Secondary	-0.063*** (0.015)	-0.073** (0.022)	-0.082*** (0.019)	-0.046* (0.023)
High School	-0.091*** (0.015)	-0.090*** (0.026)	-0.094*** (0.020)	-0.084*** (0.020)
Diploma	-0.097*** (0.014)	-0.122*** (0.033)	-0.113*** (0.023)	-0.089*** (0.019)
University or Higher	-0.132*** (0.013)	-0.074 (0.047)	-0.119*** (0.028)	-0.107*** (0.018)
Gender	0.031 (0.036)	-0.072 (0.146)	0.040 (0.035)	-0.030 (0.078)
Age	0.009** (0.036)	0.001 (0.005)	0.006 (0.004)	0.006 (0.005)
Age Squared	-0.000** (0.000)	-0.000 (0.000)	-0.000* (0.000)	-0.000 (0.000)
Family Size	0.053*** (0.004)	0.107*** (0.009)	0.045*** (0.005)	0.036*** (0.007)
Family Size Squared	-0.001*** (0.000)	-0.004*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)
Dependence Ratio	0.026*** (0.004)	0.063*** (0.008)	0.041*** (0.006)	0.033*** (0.006)
Housing Ownership	0.010 (0.009)	-0.009 (0.015)	-0.046*** (0.013)	-0.034* (0.014)
Rations	0.110 (0.057)	-0.164** (0.053)	-0.041 (0.065)	-0.077 (0.057)
Area	-0.033*** (0.007)	-0.044** (0.013)	-0.094*** (0.011)	-0.073*** (0.014)
Provinces				
Duhok	-0.070*** (0.016)	-0.113*** (0.024)	-0.109*** (0.021)	-0.131** (0.045)
Nainawa	0.070** (0.021)	0.119*** (0.029)	0.051 (0.027)	-0.095 (0.050)
Sulaimaniya	-0.069*** (0.018)	-0.007 (0.038)	-0.052* (0.026)	-0.117** (0.044)
Kirkuk	-0.038 (0.021)	0.007 (0.039)	-0.035 (0.027)	-0.132** (0.047)
Erbil	-0.037* (0.018)	-0.091** (0.029)	-0.090** (0.026)	-0.135** (0.046)
Diyala	0.132*** (0.026)	0.205*** (0.032)	-0.014 (0.035)	-0.042 (0.067)

Anbar	-0.063*** (0.016)	-0.037 (0.025)	-0.082*** (0.023)	-0.113* (0.051)
Babylon	-0.045 (0.024)	0.046 (0.041)	0.010 (0.027)	-0.058 (0.053)
Kerbala	0.019 (0.026)	0.048 (0.040)	0.032 (0.044)	-0.087 (0.059)
Wasit	0.031 (0.023)	0.118** (0.036)	0.021 (0.026)	-0.028 (0.059)
Salah Al-Deen	-0.029 (0.017)	0.010 (0.030)	-0.018 (0.024)	0.040 (0.063)
Najaf	-0.076*** (0.020)	-0.041 (0.037)	-0.038 (0.033)	-0.080 (0.049)
Qadisia	0.150*** (0.028)	0.337*** (0.045)	0.266*** (0.043)	0.078 (0.062)
Muthanna	0.150*** (0.028)	0.340*** (0.053)	0.252*** (0.046)	0.088 (0.084)
Thi-Qar	0.164*** (0.025)	0.184*** (0.036)	0.232*** (0.036)	0.057 (0.079)
Maysan	0.164*** (0.024)	0.163*** (0.036)	0.234*** (0.036)	-0.043 (0.054)
Basrah	-0.021 (0.018)	0.005 (0.028)	0.042 (0.030)	-0.062 (0.066)
Chi-square	1473.87***	946.78***	950.32***	334.47***
Pseudo R-squared	0.329	0.273	0.290	0.249
Number of Observations	6,024	3249	3,720	2124

Note: The standard errors are within the parenthesis. *** p<.001, ** p<.01, * p<.05

2.5 Conclusion

This study examines the determinants of family poverty in Iraq by conducting separate analyses based on different categories, including national, regional, and economic sector classifications. It utilizes data from the second round of the Iraq Household Socio-Economic Survey (IHSES 2012). The study employs the Logistic Regression Technique, to evaluate the impact of various explanatory variables on the likelihood of a family being classified as poor. The concept of absolute poverty is used to differentiate between poor and non-poor families, with the absolute poverty line defined by the Iraqi Ministry of Planning in collaboration with World Bank experts. Drawing from an extensive literature review and the context of household poverty in Iraq, fifteen explanatory variables have been selected to analyze the factors contributing to family poverty.

Findings at the national level on the factors influencing family poverty show that higher educational attainment is associated with a reduced likelihood of poverty, with a more pronounced effect observed in rural areas compared to urban settings. Although education has potential benefits for poverty alleviation, its effectiveness in Iraq is relatively diminished due to the country's conflict-affected status and chronic underfunding of the education sector, which has resulted in inadequate infrastructure. The findings also highlight that female-headed households experience lower poverty rates, while larger family sizes and higher dependency ratios are linked to increased poverty. Homeownership is positively correlated with reduced poverty risk. Although food rations from Iraq's PDS do not significantly impact overall poverty rates, they are more effective in reducing poverty in rural areas. The study further underscores the importance of the family head's employment status, with government or self-employment associated with lower poverty rates compared to private sector or wage-based jobs. This effect is more substantial in rural areas compared to urban areas. Additionally, households involved in agriculture face higher poverty levels compared to those in non-agricultural sectors. Urban residency and living in the KRI, are linked to a lower probability of poverty, indicating regional disparities in poverty risk.

By categorizing Iraq into the KRI and the RI, the effect of educational attainment on poverty reduction is significantly less pronounced in the KRI compared to RI. In KRI, the influence of family size and dependency ratios on poverty is lower than in the rest of Iraq. Government-distributed food rations effectively reduce poverty in KRI, though their impact is not significant in the rest of Iraq. Employment in the government sector or self-employment reduces poverty across both regions, but the effect is more substantial in the rest of Iraq compared to KRI. Additionally, urban residency decreases the probability of poverty in both

regions, with a more pronounced effect observed in the rest of Iraq compared to KRI. This suggests that rural conditions are more challenging in the rest of Iraq than in KRI.

The analysis investigates the factors influencing family poverty based on the employment sector of the household head. It reveals that the effect of education on poverty reduction is notably greater for households headed by individuals in the government sector compared to those in the private sector. Family size and dependency ratio have a substantial effect to increase the probability of poverty for households led by private sector employees, whereas its impact is less pronounced for those in other sectors. Additionally, the food distribution program notably reduces poverty for private sector workers, though its impact is not significant for other employment sectors.

The findings of this study offer valuable insights for policymakers aiming to mitigate poverty in Iraq. It is evident that increasing the impact of educational attainment on poverty alleviation is crucial. The limited effectiveness of education in addressing poverty is largely due to several factors, including the implementation of short-term social programs by successive governments that lack long-term strategies and policies. These short-term measures, often motivated by electoral considerations, reflect inadequate budgetary allocations that undermine the quality of public education and prevent it from becoming a governmental priority. Consequently, this deterioration in educational quality diminishes the potential of education to alleviate poverty (Tilak, 2002). To address this issue, a substantial increase in education sector funding is essential, particularly in provinces that are more vulnerable and have lower enrollment rates, such as the southern regions. Efforts should focus on enhancing access to quality education by expanding school infrastructure and providing scholarships, improving education quality through investments in teacher

development, curriculum updates, and necessary resources, and promoting lifelong learning through adult education and vocational training.

Government efforts to reduce poverty have had some effect, but their impact is relatively minor given the substantial budget allocations. Significant portions of the government budget are allocated annually to the PDS and the SPN, which receive far more funding than essential sectors like health and education. For example, the 2023 Iraqi budget allocated approximately 4.75 billion dollars to the SPN and 1.15 billion dollars to the PDS, whereas only 390 thousand dollars were allocated to investment in education sector[4]. According to the World Bank's 2018 report, despite extensive spending on these programs, the PDS suffers from severe inefficiencies, and the SPN's social transfers are poorly targeted (World Bank, 2011; 2018). Therefore, it is crucial to reform and more effectively target these programs to better support the most vulnerable families and individuals. Furthermore, the study's findings on dependency ratios highlight important policy implications. They show that high dependency ratios impose significant financial burdens on families, complicating their ability to escape poverty. To address these challenges, policymakers need to increase access to affordable childcare, such as public kindergartens, and improve eldercare services, such as affordable nursing homes, to reduce the pressure on families.

Furthermore, Iraq's heavy reliance on oil revenues, which account for over 99% of its exports, 85% of its government budget, and 42% of its GDP (World Bank, 2022), has significantly constrained economic diversification and job creation. This dependency has led to the "natural resource curse" and Dutch Disease, where oil revenues are largely spent on consumption rather than investing in critical sectors like healthcare, education, and skills

[4] Federal Budget Law of the Republic of Iraq for Fiscal Years (2023,2024, and 2025). Retrieved from https://www.mof.gov.iq/pages/ar/FederalBudgetLaw.aspx

training (Yousif, 2012). Consequently, Iraq's rentier economy fosters a large public sector and a stunted private sector, limiting employment opportunities and leaving the educated workforce underutilized. With one public employee for every 8.1 citizens and over 4 million employed in the government sector (World Bank, 2018), the allure of public sector jobs discourages private sector growth and exacerbates income inequality.

The labor market's challenges in Iraq are exacerbated by the high rates of youth not engaged in employment, education, or training (NEETs), particularly among internally displaced persons (IDPs). This situation, akin to the Pigeonhole Principle, illustrates a critical mismatch where the number of job seekers exceeds the available opportunities, leading to underemployment and increased poverty. Introduced by Johann Peter Gustav Lejeune Dirichlet in 1834, the Pigeonhole Principle highlights how insufficient "pigeonholes" (job opportunities) for the excess "pigeons" (workers) results in economic hardship (Rittaud & Heeffer, 2014; ILO, 2018). To address this issue, the government must implement immediate short-term strategies focused on large-scale job creation through investments in construction, agriculture, agribusiness, and vocational skills development. These sectors can offer substantial employment opportunities, especially for vulnerable groups like youth, women, and IDPs (Bandiera et al., 2019). This strategic approach can help align job supply with the growing demand, mitigate unemployment, and alleviate poverty, echoing the need for immediate action and long-term planning.

A key limitation of this study is its reliance on data from the second round IHSES 2012 survey, which, while comprehensive with approximately 20,000 observations and extensive information, may raise concerns about its age in relation to the current context. Although a more recent survey was conducted in 2017, it includes fewer than 1,500 observations and lacks the breadth of data necessary for the in-depth analysis required for this study. In

addition, 2017 survey encountered limitations due to security concerns, particularly in areas under ISIS control at this time. Consequently, nine districts in Nineveh and five additional districts in Anbar, Baghdad, and Salah al-Din were excluded. This restriction resulted in a final sample encompassing only 106 of the country's 120 districts, which may affect the survey's overall representativeness. The IHSES 2012 data still provides valuable insights into the determinants of household poverty, and the findings remain relevant in understanding long-standing structural factors influencing poverty in the country. Nonetheless, the potential for changes in the factors influencing poverty over time is acknowledged, and this limitation is considered when interpreting the results. The planned third round of IHSES for 2017 was delayed due to security and budgetary constraints. Should this dataset become available, future research could benefit from analyzing the updated determinants of poverty and comparing the findings with those of the IHSES 2012.

3. INTERGENERATIONAL EDUCATIONAL MOBILITY IN IRAQ

3.1 Introduction

An aspect of capitalism involves the passing down of accumulated advantages, particularly in terms of wealth and human capital, from one generation to the next. Economists find the study of intergenerational socioeconomic mobility compelling because it provides insights into the expected socioeconomic status of the next generation. Over the long term, there is a tendency for higher income inequality to coincide with lower intergenerational mobility. Countries with significant income disparities also tend to exhibit a pronounced transmission of intergenerational inequality (Milanovic, 2019). Therefore, by assessing or quantifying intergenerational mobility within a nation, we can gauge the extent of inequality present.

Numerous scholars, such as Becker and Tomes (1968), Solon (1999, 2002), Black and Devereux (2010), and Latif (2018) have underscored the pivotal role and impact of parents' educational backgrounds in shaping the educational outcomes of their descendants. The research by Black and Devereux (2010) suggests that improving early childhood education can boost mobility. It is important to note that intergenerational mobility is not solely influenced by heritable cognitive factors but is also significantly shaped by parental investments in their children (Becker & Tomes, 1968). Reduced educational mobility indicates a lower level of opportunity equality, suggesting that individuals with less educated parents are more prone to maintaining a disadvantaged position or achieving lower educational levels. Conversely, those with highly educated parents are more likely to retain a privileged status (Latif, 2018).

This study seeks to investigate intergenerational educational mobility in Iraq, with a specific focus on birth cohorts from 1960 to 1989. The background information about the educational

environment in Iraq during that timeframe offers valuable insights into the significance of this study. In 1958, a military coup brought an end to the Iraqi monarchy, leading to the establishment of a republic. The new government continued the efforts initiated by the monarchy regime by constructing new schools and enhancing educational accessibility. Notably, the budget allocated to the education sector saw a twofold increase, rising from $36 million in 1958 to $67 million in 1960 (Marr, 2012). This surge in funding led to a threefold increase in the number of students across all education levels, contributing significantly to improved literacy rates during that period (Tripp, 2007). With the nationalization of Iraq's oil industry in the 1970s, the government substantially augmented the budget allocated to social programs, including education. This increased funding facilitated the construction of new schools and the hiring of additional teachers (Marr, 2012). Moreover, in 1976, the government enacted three pivotal laws to enhance the education system. Firstly, it granted free education at all levels, from primary school to university. Secondly, the Compulsory Education Law required six years of schooling or the completion of primary education. Thirdly, the eradication of illiteracy Law initiated a national campaign to combat illiteracy (De Santisteban, 2005).

The Iran-Iraq war that spanned from 1980 to 1988, hindered any further progress in the education sector and mitigated the positive effects of preceding reforms. The country, burdened by the prolonged conflict, faced enduring challenges that impacted multiple generations (Roy, 1993). A significant portion of Iraq's resources and budget was redirected towards military objectives, at the expense of social programs, including the education sector. The consequences of the war were extensive, leading to the destruction of numerous schools and the conscription of many teachers and students into the military (ReliefWeb, 2003). Following the protracted conflict, Iraq found itself entangled in another war with Kuwait,

attempting an invasion in 1990. This prompted the imposition of economic sanctions by the United Nations Security Council through Resolution 661 on August 6, 1990, which persisted until Resolution 1483 on May 22, 2003, signaling the end of all sanctions. The stringent sanctions had a profound impact, subjecting the country to a challenging period of economic instability that directly affected the education system, leading to a significant decline in its quality. The repercussions of both war and sanctions were not confined to the generation living during that period but also extended to future generations (De Santisteban, 2005).

The public education sector has experienced detrimental effects due to a series of conflicts and mismanagement, as discussed earlier. As a result, an augmentation in the count of students receiving substandard education leads to a scenario where capital and job opportunities in the market become disproportionately available to individuals with higher qualifications or superior education. Consequently, this trend contributes to a continuous escalation of the inequality gap within the country. Moreover, if there is a high degree of educational persistence, the current challenges faced by the present generation may persist into the next. This underscores the importance of examining intergenerational educational mobility, providing insights for relevant authorities to take necessary actions and prevent further deterioration in the educational prospects of the next generation. This research marks a pioneering effort as the first attempt to quantify and explore intergenerational educational mobility in Iraq.

The aim of this study is to measure and identify the trends of intergenerational educational mobility in Iraq and to investigate the impacts of armed conflicts, and sanctions from the 1980s to the 1990s on the mobility patterns across generations. Additionally, this study seeks to identify education mobility between parents and their descendants by decomposing the correlation coefficient based on parents' education levels. Unlike most previous studies that

have predominantly focused on the mobility between fathers and their descendants, this research makes a significant contribution by addressing gender disparity in educational mobility. It investigates the mobility patterns from both mothers and fathers to their descendants, separately, and examines the mobility from parents to sons and daughters independently. Additionally, this study provides a detailed analysis of educational mobility across all Iraqi provinces, thereby shedding light on regional gender disparities.

The key findings of this study can be summarized as follows: Firstly, despite the identification of a high level of intergenerational educational mobility in Iraq, there is an observed decline in this mobility over time. Educational mobility is higher and more sustained between mothers and their descendants than between fathers and theirs. Secondly, the transmission of education between generations is notably polarized. It means that descendants from less educated or disadvantaged families are more likely to remain in a disadvantaged position, while those from highly educated or privileged families often retain their elevated levels of educational attainment. Thirdly, although educational mobility is higher between parents and sons compared to parents and daughters, there is a noteworthy improvement in the educational attainment of female descendants. Lastly, the persistence of education varies significantly across provinces.

The remaining sections of the chapter are structured as follows: Section 3.2 offers a review of studies on intergenerational educational mobility in different countries. Section 3.3 outlines the utilized data and methodology. The findings and discussions are presented in Section 3.4, and the conclusion is provided in Section 3.5.

3.2 Literature Review

Research on intergenerational educational mobility has mainly focused on developed countries due to the availability of extensive and high-quality data sets. Limited data in developing countries has hindered studies in this area. Although there are no studies solely focused on Iraq, limited cross-country panel studies have included Iraq in their analysis of intergenerational educational mobility across various nations. In an extensive analysis conducted by the World Bank, Narayan et al. (2018) examined intergenerational mobility across 148 countries, including 10 in the Middle East and North Africa (MENA) region. The findings reveal that intergenerational educational mobility improved in high-income economies from the 1940s to the 1980s, whereas mobility in developing economies experienced a slight decline, widening the gap between these groups. For the cohort born between the 1960s and the 1980s, the correlation coefficient in developing economies increased from 0.4 to 0.5. Leone (2019) and Driouchi et al. (2017) conducted notable cross-country studies and found that the correlation coefficient for Iraq was slightly higher than the range observed for developing countries in a World Bank study. For the cohort born in the 1980s in Iraq, they estimated the correlation coefficient to be approximately 0.51. Leone (2019) utilizes harmonized data from 148 countries, focusing on the transmission of educational achievements across generations. The primary finding indicates a stronger persistence of intergenerational educational mobility in less developed countries. In the MENA region, Leone's study estimated correlation coefficient remains steady and has increased over the past five decades. In addition, the results of the Driouchi et al. (2017) study demonstrate that the majority of Arab countries, including Iraq, have experienced high levels of educational mobility. Additionally, Driouchi & Gamar (2016) investigate differences between social mobility and educational attainment in Arab countries compared

to Eastern and Central European economies. The study shows a decline in social mobility in Arab countries relative to educational attainment, mirroring similar patterns observed in economically comparable Eastern and Central European nations. Another recent effort is the study by Dendir (2023), which investigated intergenerational educational mobility across 22 nations in Sub-Saharan Africa using recent national census data spanning six cohorts born from the late 1950s to the early 1990s. Using the intergenerational correlation measure, it revealed that most countries exhibited a correlation coefficient ranging between 0.3 and 0.5, indicating moderate to low persistence in educational outcomes across generations.

Another significant aspect to address in connection with mobility involves examining the significance of gendered patterns in the intergenerational transmission of education. Sparse research underscores a potential disparity in education mobility from parents to their sons and to their daughters, investigating how mothers and fathers influence variations in educational persistence across generations. A recent significant study by Hu and Qian (2023) emphasizes the critical role of mothers in intergenerational educational mobility. Analyzing data from 1.79 million individuals born between 1956 and 1990 across 106 countries, the study reveals that mothers' educational status has become increasingly important, sometimes surpassing that of fathers, especially in recent cohorts. This highlights substantial gender differences, with maternal education being crucial for children's educational outcomes. Another noteworthy effort is the study by Driouchi et al. (2017), which aims to measure intergenerational mobility and educational attainment inequality among women in the Arab world, using annual school attainment data from 1950 to 2010. Despite detecting a notable upward trend in educational attainment and a decrease in education inequality in the Arab world, males have a higher proportion of improvement compared to females.

Moreover, according to studies such as Azam and Bhatt (2015), McClendon et al. (2018), Latif (2018), and Aydemir & Yazici (2019), patterns of educational mobility across generations, including gender disparities, may vary significantly across distinct regions and among various ethnic or social groups within a country. Azam and Bhatt (2015) undertook research on the transmission of educational achievement across generations in India, analyzing birth cohorts spanning from 1940 to 1985. The results of their study highlighted variations in the pattern of educational persistence among social groups and significant differences in educational persistence across different states in India. A notable finding from McClendon et al.'s (2018) global study is that Muslim women, on a worldwide scale, have lower educational levels and more pronounced gender gaps compared to all other religious groups, except Hindus. This mirrors earlier observations of diminished female attainment and broader gender gaps in countries where Islam predominates. However, the study also underscores significant educational progress among Muslim women in more recent cohorts. Latif (2018) investigates the intergenerational persistence of education in Canada for cohorts spanning from 1940 to 1989. The study reveals gender-specific trends in correlation coefficients, indicating an upward trajectory for sons and a downward trend for daughters, alongside variations in educational mobility patterns across generations that are influenced by regional and demographic factors. Aydemir & Yazici (2019) explore the connection between intergenerational educational mobility and economic development in Turkey. Gender plays a role in this relationship, with a less clear association for males, while females demonstrate notable educational advancement in developed regions, reflecting diminished reliance on parental educational achievements.

The exploration of intergenerational educational mobility has gained significant attention among economists, with numerous studies primarily concentrating on developed countries

due to the abundance of available longitudinal data. Conversely, research in developing nations has been constrained by data limitations. Despite this trend, the scarcity of accessible data for researchers may contribute to the limited attention given to intergenerational mobility studies in Iraq. Therefore, this paper represents a pioneering initiative to investigate educational mobility across generations in Iraq. Apart from determining the coefficient and trend of educational mobility at both the national and provincial levels, the study will also endeavor to identify gender disparities in educational mobility in Iraq and its individual provinces.

3.3 Data and Methodology

3.3.1 Data Description

This study utilizes the second Iraq Household Socio-Economic Survey (IHSES 2012), as no other surveys of a similar nature have been conducted since that time. The IHSES 2012 was developed collaboratively by Iraqi government statistical institutions with support from the World Bank during 2012-2013. The survey results were subsequently published in 2015 (World Bank, 2015). The IHSES 2012 data were collected from 118 districts across all 18 provinces in Iraq, comprising a total sample of 24,944 households and 176,042 individuals nationwide. For the purposes of this study, the focus is on individuals born between 1960 and 1989. Following the extraction of the specific individuals' data targeted for this study, the total number of remaining observations for our analysis is 30,831. These generations are the first to be born and grow up after the shift in the Iraqi political system from a monarchy to a republic in 1958. Furthermore, these generations are particularly influenced by the Iran-Iraq war, which may have transformative effects on the subsequent generation. In addition, the

youngest individuals in the selected sample may have completed their education by the time the survey was conducted[5].

Table 3.1: Descriptive statistics for years of schooling

Cohorts	Obs.	Sample Share	Descendant Years				Parent Years			
			Sons		Daughters		Fathers		Mothers	
			Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
1960-1969	8095	26.26%	8.31	5.37	5.30	5.26	1.18	3.33	0.24	1.41
1970-1979	12705	41.21%	6.68	5.37	5.17	4.90	1.88	4.01	0.45	1.93
1980-1989	10031	32.54%	5.13	5.14	5.06	5.15	2.97	4.90	1.08	3.04
Whole Sample	30831	100.00%	6.89	5.45	5.15	5.08	2.05	4.22	0.60	2.28

The IHSES 2012 solely classifies the educational accomplishments of both parents and their descendants in relation to the highest completed grade, without providing specific information on the number of schooling years. When the exact years of education are unavailable, an alternative estimation method, proposed by Black & Devereux (2010), involves substituting the years required to complete a standard education level. Consequently, for the purpose of this study, I categorize the data into five groups: illiterate, primary, intermediate, secondary, and university education and above. Additionally, I convert the data type from categorical to numeric or to the number of years needed to attain the corresponding education level[6]. ***Table 3.1*** illustrates the range and sample distribution of each cohort, along with the progression of the mean and standard deviation of the years of education completed by both descendants and parents.

The effects of wars and economic sanctions on these cohorts are clearly observable by looking the average of descendants' years of schooling, as presented in ***Table 3.1***. Despite facing numerous challenges, the impact of policies such as free education, compulsory education, and the campaign to eradicate illiteracy proved remarkably effective. Notably, these policies had a particularly positive influence on women, leading to an increase in

[5] According to Iraqi education system, students at least need 22 years to finish university.
[6] Acquired years for all five education levels in Iraq are as follows: 1) illiterate: 0 year, 2) primary: 6 years, 3) intermediate: 9 years, 4) secondary: 12 years, and 5) university: 16 years.

literacy rates and educational achievements in primary education (Roy, 1993; De Santisteban, 2005). Examining the data on daughters' years of schooling from ***Table 3.1***, it is evident that females experienced a lesser degree of impact from these instabilities. It demonstrates a gradual decrease in the average years of school for female descendants, from 5.30 for the 60s cohort to 5.03 for the 80s cohort. However, the average years of school for male descendants notably decreased from 8.31 for the 60s cohort to 5.13 for the 80s cohort. The significant reduction in female illiteracy rates was notably influenced by the increased demand for female labor during the Iran-Iraq war. From the onset of the war in 1980 to its conclusion in 1988, there was a substantial decrease in illiteracy rates, especially among females. For instance, the female illiteracy rate decreased significantly from 72.7% to 12.5%, and for males, it decreased from 37.1% to 9.8% (Roy, 1993). Additionally, female participation at the primary level was nearly on par with males during the 1980s, with approximately 47% for females and 53% for males (De Santisteban, 2005).

3.3.2 Methodology

Scholars commonly employ two widely recognized measures to assess intergenerational educational mobility: the regression coefficient (β_t) and the correlation coefficient (ρ_t). The estimation of the intergenerational educational regression coefficient (β_t) involves a univariate ordinary least squares (OLS) regression, where descendant education attainment is regressed on parental education attainment, as outlined in equations (1) and (2):

$$c_{it} = \alpha_t + \beta_t f_{it} + \varepsilon_{it} \qquad (1)$$

$$c_{it} = \alpha_t + \beta_t m_{it} + \varepsilon_{it} \qquad (2)$$

where c_{it} and f_{it} (m_{it}) represent the acquired years of obtained education level of child i and his/her father (mother) of cohort t, respectively.

In this study, our emphasis is on the correlation coefficient (ρ_t), a suitable metric for gauging the evolution of mobility over time. The correlation coefficient (ρ_t) measures the change of how strong relationship between parents and child's education (Aydemir & Yazici, 2019). Parents and descendants' years of schooling should adjust with their respective standard deviation before estimating the correlation coefficient (ρ_t). This adjustment is accomplished by dividing the schooling years variable for parents and descendants by their corresponding standard deviation (σ_t):

$$c_{it}^{a} = \gamma_t + \rho\, f_{it}^{a} + u_{it} \qquad (3)$$

$$c_{it}^{a} = \gamma_t + \rho\, m_{it}^{a} + u_{it} \qquad (4)$$

Where $c_{it}^{a} = \frac{c_{it}}{\sigma_t^{c}}$, $f_{it}^{a} = \frac{f_{it}}{\sigma_t^{f}}$ and $m_{it}^{a} = \frac{m_{it}}{\sigma_t^{m}}$.

According to equation (3) and (4), a higher value of ρ shows that education attainments' level of descendent is strongly related or influenced by their parents. However, if the value of ρ is near to zero or insignificant this indicates that descendants' education attainment is independent from their parent's education (Öztunalı & Torul, 2022).

In addition, the value of the coefficient ρ can serve as a metric for the level of inequality in opportunities that is attributable to external factors, such as a child's background or circumstances. This measure is intended to exclude any effects of the child's own efforts or abilities (Checchi , Fiorio , & Leonardi, 2013). To underscore this point, the correlation coefficient can be reformulated as follows:

$$\rho_{tf} = \int \underbrace{\big(c - E(c)\big)\big(f - E(f)\big)}_{\boldsymbol{a}} \underbrace{\Pr(c|f)}_{b} \underbrace{\Pr(f)}_{c} \qquad (5)$$

$$\rho_{tm} = \int \underbrace{\big(c - E(c)\big)\big(m - E(m)\big)}_{a} \underbrace{\Pr(c|m)}_{b} \underbrace{\Pr(m)}_{c} \qquad (6)$$

Equations (5) and (6) reveal the influence on the coefficient ρ stemming from the spread of children's and parents' education around their respective means (a), the change of children education conditional that of their parents (b), and the distribution of parental education (c).

The empirical analog of equation 5 and 6 are used to further decompose of the correlation coefficient to identify the stability of correlation coefficients further,

$$\rho_{tf} = \sum_{c}\sum_{f}(c - E(c))(f - E(f))Pr(c|f)\Pr(f) = \sum_{c}\sum_{f} r_t(c,f) \qquad (7)$$

$$\rho_{tm} = \sum_{c}\sum_{m}(c - E(c))(m - E(m))Pr(c|m)\Pr(m) = \sum_{c}\sum_{m} r_t(c,m) \qquad (8)$$

Where $r_t(c,f)\ and\ r_t(c,m)$ are absolute contributions to ρ_t of families with c the descendant's education level, *f* the father's, *m* the mother's education level. ***Tables A3.1*** and ***Table A3.2*** in the ***Appendix 3.1*** present the components of $\sum_c \sum_f r_t(c,f)$ and $\sum_c \sum_m r_t(c,m)$, with additional comprehensive details to be supplied in the results section.

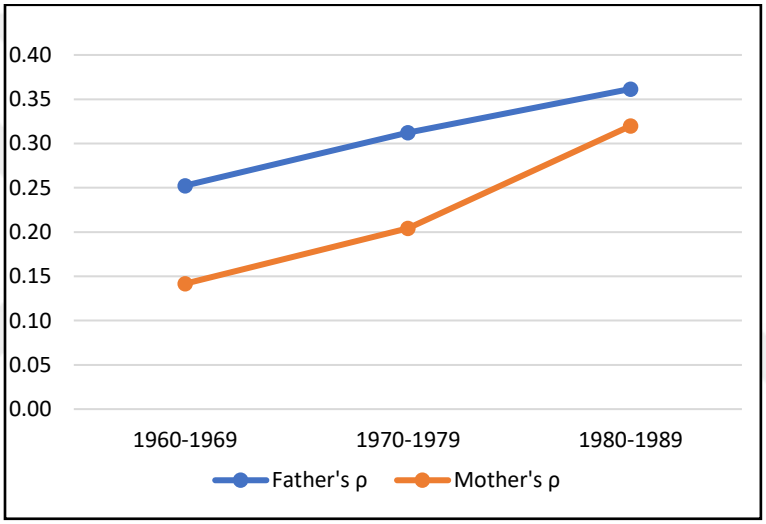
3.4 Results

3.4.1 Intergenerational Educational Mobility Across Iraq

Figure 3.1 illustrates the magnitude and trend of the correlation coefficient (ρ_t) between parents and descendants for all cohorts from 1960 to 1989. It reveals two significant findings. Firstly, the correlation coefficients of mothers (ρ_{tm}) with their descendants are noticeably lower than those of fathers (ρ_{tf}). Moreover, the increase of mothers' correlation coefficients (ρ_{tm}) is more rapid when compared to fathers' correlation coefficients (ρ_{tf}). Secondly, despite the generally low intergenerational educational correlation coefficients (ρ_t) in Iraq, particularly in the earlier cohorts, a clear upward trend is evident. For instance, in the 1960-1969 cohort, the coefficients were 0.25 (father) and 0.14 (mother), whereas in the 1980-1989

cohort, they rose to 0.36 (father) and 0.32 (mother). The upward trends in the correlation coefficient align with the findings of the World Bank study, which examined a large group of developing countries (Narayan, et al., 2018). However, the correlation coefficient values observed in this study are lower than the range of 0.4 to 0.5 identified for developing countries in the World Bank study.

Figure 3.1: The trend of intergenerational educational correlation coefficients of fathers and mothers with their descendants



The increasing trend of correlation coefficients in Iraq may be attributed to a noticeable rise in the relative contributions of both low and high-educated descendants, conditioned on low and high parental education, respectively, within the 1960-1989 cohorts. A detailed explanation of this phenomenon will be provided later. I identified consistently lower intergenerational educational correlation coefficients in Iraq when compared to earlier studies such as Leone (2019) and Driouchi et al. (2017), which reported an estimated correlation coefficient (ρ) of approximately 0.51. However, the upward trend in correlation coefficients in Iraq aligns with the findings of Leone (2019), who observed an increasing estimated correlation coefficient (ρ) over the last five decades in the MENA region. Similar

patterns are evident in two Asian countries, Indonesia and Vietnam, as demonstrated by Hertz et al.'s (2007) study, which covered estimations for 42 different countries. Furthermore, Azam & Bhatt (2015) noted a slight increase in intergenerational correlation in India, and Öztunalı & Torul (2022) showcased an upward trend in correlation coefficients for the cohorts 1965-1985 in Turkey. However, Tansel (2015) represents the initial effort to examine the correlation between parents' and children's education in Turkey over time. Despite an overall decreasing trend in the intergenerational educational coefficient for both mothers and fathers, mothers display a slightly higher coefficient.

Table A3.1 and ***Table A3.2*** in display the elements of $r_t(c,f)$ and $r_t(c,m)$ as per equations (7) and (8) for all cohorts, respectively. In both tables, Line 31 provides the correlation coefficients for fathers (ρ_{tf}) and mothers (ρ_{tm}), representing the sum of combined absolute and relative contributions of descendants and parents. Line 6 presents the overall contribution of descendants with illiterate fathers and mothers to ρ. The relative contributions of children with an illiterate father significantly increased over time, from 11% for the 1960-1969 cohort to 25% for the 1980-1989 cohort. Additionally, the relative contributions of children with an illiterate mother also increased over time, albeit to a lesser extent, from 3% for the 1960-1969 cohort to 11% for the 1980-1989 cohort. This outcome suggests that the Iraqi community exhibited lower levels of education, a common observation attributed to the series of conflicts the country faced, coupled with limited attention from both the government and families towards education. Additionally, a considerable number of children lacked the opportunity to enroll in primary education. According to Al-Shaikhly (1974), 43.2% of eligible children did not attend primary school during the academic year 1960-61, a figure that increased to 44.3% by the academic year 1969-70. Line 30 shows the total contribution to ρ made by children with highly educated parents, demonstrating that this group

consistently accounts for a significant share of the total correlation over time. The relative contributions of children with fathers holding a university degree or higher exhibited a steady increase over time, rising from 42% in the 1960–1969 cohort to 45% in the 1980–1989 cohort. Similarly, the contributions of children with mothers holding a university degree or higher also grew over the same period, with a more pronounced increase in the latest cohort, escalating from 20% in the 1960–1969 cohort to 41% in the 1980–1989 cohort.

The primary contributors to ρ were illiterate descendants with an illiterate father (mother), accounting for 52% (42.41%) of the entire sample on average across all cohorts. A noticeable rise in the proportion of illiterate descendants with illiterate fathers is evident in ***Table A3.1***, increasing from 48% for the 1960-1969 cohort to 56% for the 1980-1989 cohort (reported in Line 1). Moreover, the relative contributions of illiterate descendants with illiterate mothers slightly increased, as indicated in Line 1 of ***Table A3.2***, from 42% for the 1960-1969 cohort to 43% for the 1980-1989 cohort. The eight-year Iran-Iraq war in the 1980s, the Kuwait war in 1990, and subsequent sanctions imposed on Iraq are significant factors contributing to an increase in descendants with uneducated and primary degree holders with parents who were either illiterate or had only completed primary education. Furthermore, the findings suggest that political instabilities in Iraq had a disproportionately greater negative impact on families already facing educational deprivation.

Lines 1 suggests a limited degree of educational mobility, indicating that children of uneducated and low-educated parents are more likely to have lower educational attainment in this society. Similarly, highly educated descendants tend to come from parents with higher education levels, as observed in line 29. These outcomes align with various studies employing similar decomposition methodologies, including Checchi, Fiorio, and Leonardi (2013), Azam & Bhatt (2015), and Öztunalı & Torul (2022). A consistent and significant

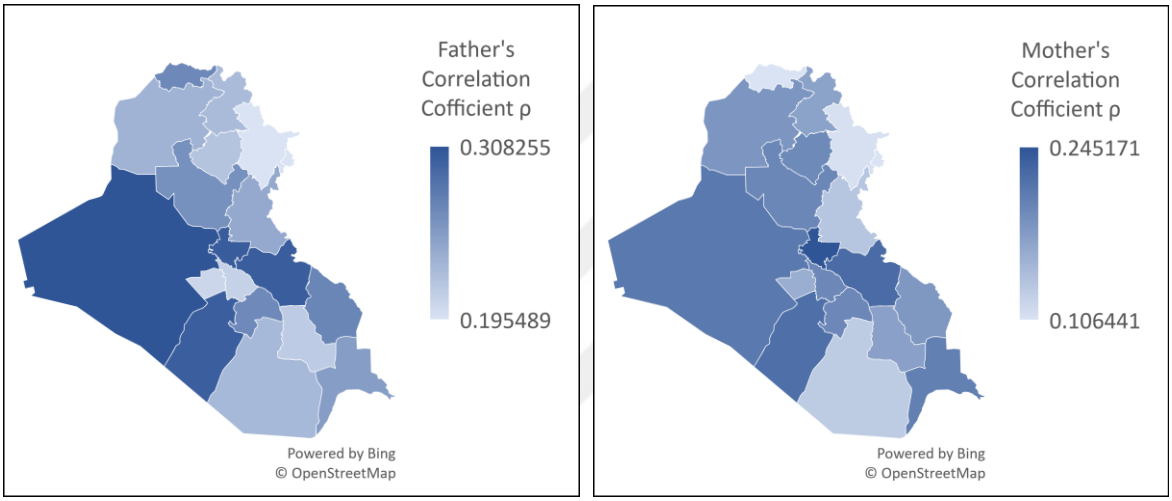
finding is that the transmission of education across generations in Iraq is markedly polarized. This implies that descendants from less educated or disadvantaged families are more likely to persist in a disadvantaged educational position, while those from highly educated or advantaged families tend to sustain their higher levels of educational attainment. In addition, these factors may be the primary drivers behind the observed upward trend in the intergenerational educational correlation coefficient in Iraq.

3.4.2 Intergenerational Educational Mobility Across Iraqi Provinces

To perform the regional analysis, the educational mobility of each province is individually calculated for the entire period. The ensuing ***Figure 3.2*** illustrates substantial variations in educational persistence among provinces in Iraq. The differences in government education policies targeting various provinces can be identified as a potential factor contributing to the influence on these outcomes. For instance, Azam and Bhatt (2015) revealed significant disparities in educational persistence across Indian states in their study. They suggested that state-level disparities in education policy and other institutional factors could potentially explain this variation. Chetty, Hendren, Kline, and Saez (2014) associated regional disparities in mobility measures across the United States to the specific characteristics of local areas, suggesting that differences in public education funding across regions may contribute to variations in intergenerational income mobility. This implies that augmenting public investment in education has the potential to foster increased mobility within the region. In addition, similar to the outcomes proposed in the studies by Azam and Bhatt (2015) and Latif (2018), variations in intergenerational educational mobility can be influenced by ethnic and demographic factors. Thus, variations in attitudes toward education among ethnic groups, influenced by cultural differences, represent an additional factor that may contribute to the educational mobility gap between provinces in Iraq. Certain cultures may prioritize

academic achievement and education, whereas others may have distinct priorities or encounter cultural obstacles that impact educational opportunities. Concerning the three primary ethnic groups in Iraq, namely the Shia-Arabs, Sunni-Arabs and Kurds populations, the perspectives of these ethnic groups may different regarding the importance of education and parental investment in their children's education.

Figure 3.2: Intergenerational educational correlation coefficient for all Iraqi provinces



(a) Correlation Coefficient of Father

(b) Correlation Coefficient of Mother

3.4.3 Intergenerational Educational Mobility Across Gender

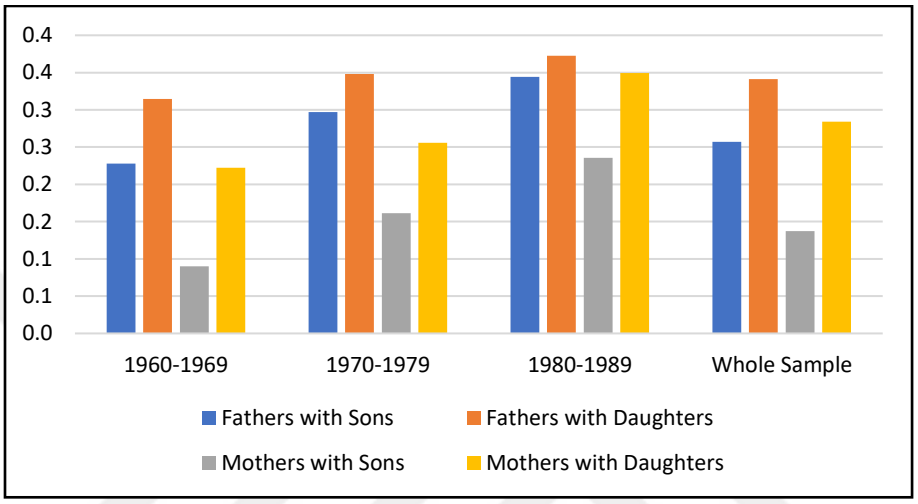
It is crucial to analyze the educational mobility from parents to their sons and daughters while considering gender disparities. Iraq is notably ranked 154th out of 156 countries on the Gender Inequality Index, signifying its status as one of the worst countries in terms of gender inequality (World Bank, 2021). The study's results underscore the substantial gender disparities in Iraq regarding educational mobility. ***Figure 3.3*** illustrates a noticeable gender discrepancy in intergenerational educational mobility within Iraq. According to our research, the connection between generations in terms of education tends to be more persistent for daughters compared to sons. Across all cohorts, the correlation coefficient for fathers and

mothers with their sons is lower than that with their daughters. This indicates that educational mobility between parents and sons is significantly higher than that between parents and daughters. This finding aligns with research conducted in both developed and developing nations, where it is commonly observed that daughters tend to demonstrate higher levels of intergenerational educational persistence compared to sons. This pattern is consistent with earlier studies, including those by Ranasinghe (2015), Emran & Shilpi (2015), Azomahou & Yitbarek (2016) and Driouchi et al. (2017), which highlighted that women generally show greater educational persistence than men in countries such as Australia, India, and nine Sub-Saharan African countries, respectively. Additionally, the graphical representation indicates that mothers and their descendants exhibit a higher rate of educational mobility compared to fathers and their descendants. A similar pattern was observed in a study by Tansel's (2015) findings, where the intergenerational educational coefficient for mothers was slightly higher than for fathers. Furthermore, our findings align with Razzu & Wambile (2022), who, in their study using nationally representative survey data from 34 countries covering three-quarters of Africa's population over four decades, examined intergenerational educational mobility by gender.

As previously noted, the major contributors to the overall sample are parents lacking literacy skills. I also identified a strong persistence in the intergenerational correlation between parental education and the educational status of daughters. Consequently, there is a significantly elevated proportion of illiterate female. This outcome is unsurprising, given that many families in Iraq, especially throughout the last century, regarded their children, especially daughters, as valuable economic assets for household and agricultural labor. Furthermore, social institutions often exhibited rigidity and discouraged the education of females. This gender disparity is evident in the number of high school graduates during the

period 1965-66 to 1971-72, with 11,033 male students compared to 3,715 female students (Al-Shaikhly, 1974).

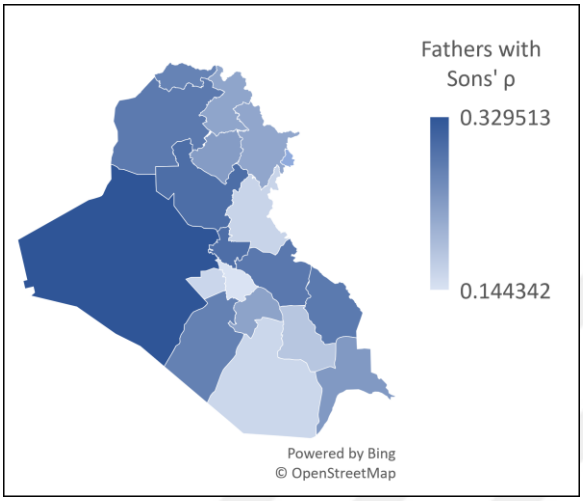
Figure 3.3: Intergenerational educational correlation coefficient for fathers and mothers with their sons and daughters



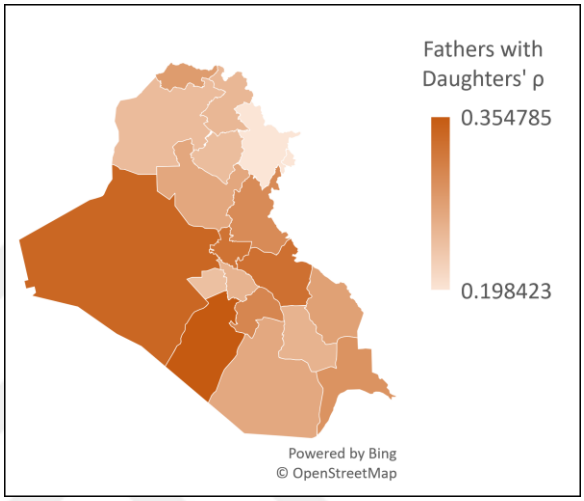
While there is evidence of a gender disparity or a persistence of education between parents and daughters, there is also a noteworthy improvement in terms of female descendants. The education sector faced significant challenges and quality deterioration due to conflicts and political instability in the 80s and 90s. The impacts of these instabilities are clearly reflected in the selected cohorts, as presented in the descriptive statistic table (***Table 3.1***). Despite both sons and daughters experiencing a reduction in the number of school years due to the successive instabilities, it appears that daughters were less affected by this situation. It is also evident in ***Figure 3.3***, where the correlation of parents with their daughters increased proportionally less than with sons. It occurred due to the positive influence of policies such as free education, compulsory education, and campaigns to eradicate illiteracy in the 70s, particularly benefiting women. Additionally, the rate of illiteracy among females decreased as the demand for female labor increased during the Iran-Iraq war. Conversely, the impact of

70s policies on males were diminished, as many male students were conscripted into the military, leading to a withdrawal from school.

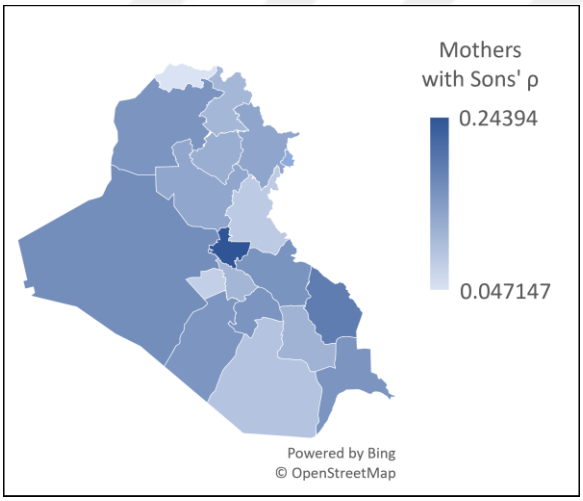
Figure 3.4: Intergenerational educational correlation coefficient of parents with sons and daughters separately for all Iraqi provinces



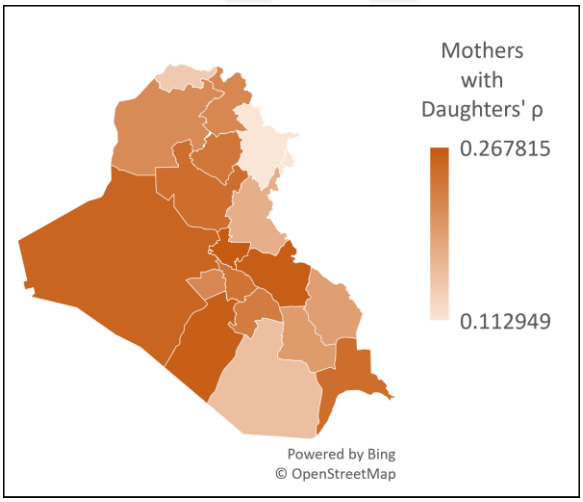
(a) Correlation Coefficient of Fathers with Sons



(b) Correlation Coefficient of Fathers with Daughters



(c) Correlation Coefficient of Mothers with Sons



(d) Correlation Coefficient of Mothers with Daughters

Figure 3.4 displays the intergenerational correlation coefficient estimates for daughters and sons with their mother and father individually in each province across the country. The consistent result from these calculations is that, in the majority of provinces, intergenerational persistence is more pronounced between daughters and their parents than sons, regardless of

whether the correlation involves mothers or fathers. This diversity may stem from several factors. Cultural norms and traditional gender roles often favor the education of boys over that of girls, especially in rural areas. Economic conditions may lead families to prioritize the education of boys for better employment opportunities, while girls are encouraged to focus on domestic roles. In addition, regional politics and historical contexts, including the impact of conflict, can further influence educational access and outcomes, shaping mobility patterns differently for sons and daughters.

3.5 Conclusion

This research marks a pioneering exploration into intergenerational educational mobility in Iraq, focusing on the cohorts spanning 1960-1989. In this chapter, I utilize data from the second Iraq Household Socio-Economic Survey (IHSES 2012), a collaborative effort between government institutions and the World Bank Organization. This chapter focuses on individuals directly impacted by the eight-year Iraq-Iran war and subsequent political and economic instability. Despite the high degree of educational mobility in Iraq, an observed declining trend in mobility is evident over the specified period for both fathers and mothers and their descendants. Educational mobility from mothers to their descendants surpasses that of fathers, demonstrating a more rapid and persistent trend compared to paternal mobility.

As per the findings of the decomposition analysis, the primary drivers of intergenerational educational mobility in Iraq were traced back to descendants with illiterate fathers and mothers. Overall, the results of the decomposition exercise underscore a highly polarized intergenerational transmission of education in Iraq. This suggests that descendants from less educated or disadvantaged families are more likely to remain in a disadvantaged position, while those from more advantaged families are more likely to maintain their favorable status.

Moreover, the analysis indicates that conflicts and political instabilities had a disproportionately negative impact on families with lower educational backgrounds, leading to an increased contribution from descendants with uneducated or less educated parents.

I compute the educational mobility for each province independently throughout the entire period. The level of educational persistence differs significantly among the provinces in Iraq, and these disparities can be attributed to two factors: variations in government educational policies toward different provinces and differences in attitudes toward education among ethnic groups. In addition, this chapter investigates the gender-based differences in educational mobility from parents to their sons and daughters, revealing a pronounced gender disparity in Iraq. Our findings indicate that the intergenerational educational link tends to be more persistent for daughters than for sons. This suggests that educational mobility between parents and sons is considerably higher than that between parents and daughters. Conversely, there is a noteworthy improvement in the educational attainment of female descendants, and the decreasing trend in educational mobility of parents with their daughters is less pronounced than with sons. Two primary factors contribute to this pattern: first, females appear to be less affected by conflicts and war situations compared to males, attributed to the conscription of many male students into the military and withdrawal from school. Second, the policies of free education, compulsory education, and the anti-illiteracy campaign in the 1970s had a more positive impact on women.

This research recommends that to safeguard the future of education and foster improved educational mobility for the next generation, it is crucial for policymakers in the Iraqi government to confront the rising education persistence between generations and mitigate gender imbalances. This necessitates strengthening support for the public education sector and guaranteeing unbiased access to high-quality educational prospects for individuals of all

genders. It is imperative to increase and efficiently utilize the allocated budget for investing in the education sector, which is currently insufficient, comprising only 5 percent of the national budget. Assaad and Saleh (2018) examined how government policies to expand public basic and secondary schools influenced intergenerational educational mobility in Jordan. They found that mobility increased significantly over time, especially for women. The educational attainment of children with uneducated parents improved notably due to the expanded supply of basic schools, with a greater impact on females, largely due to the availability of mixed-gender schools. In addition, apart from the direct impact of education, where parents transmit abilities to their children through both nurture and genetics, there is also an indirect effect. The indirect influence of education involves parents affecting variables associated with their children's education, including investments in their educational pursuits and the overall educational environment (Wang, et al., 2022). Investments in the human capital of children play a pivotal role in determining their future earnings and socioeconomic status. Parents can subtly impact their children's lifelong earning potential through factors such as family culture, as well as various monetary and non-monetary investments that mold skills, aptitudes, beliefs, and behavior (Corak, 2013).

Appendix 3.1: Decomposition Tables

Table A3.1: Decomposition of the intergenerational educational correlation coefficient for father (ρ_{tf}): 1960-1989 cohorts

Line	Family Type	1960-1969		1970-1979		1980-1989	
		$r_t(c,f)$	$\frac{r_t(c,f)}{\rho_{tf}}$	$r_t(c,f)$	$\frac{r_t(c,f)}{\rho_{tf}}$	$r_t(c,f)$	$\frac{r_t(c,f)}{\rho_{tf}}$
1	F:0, C:0	0.12	48%	0.16	51%	0.20	56%
2	F:0, C:6	0.02	7%	0.00	-1%	-0.03	-7%
3	F:0, C:9	-0.01	-5%	-0.02	-7%	-0.02	-6%
4	F:0, C:12	-0.03	-11%	-0.02	-7%	-0.01	-3%
5	F:0, C:16	-0.07	-27%	-0.06	-20%	-0.05	-15%
6	**F:0**	**0.03**	**11%**	**0.05**	**17%**	**0.09**	**25%**
7	F:6, C:0	-0.01	-6%	-0.02	-7%	-0.03	-7%
8	F:6, C:6	-0.01	-2%	0.00	0%	0.01	2%
9	F:6, C:9	0.01	3%	0.01	3%	0.01	2%
10	F:6, C:12	0.01	5%	0.01	3%	0.01	1%
11	F:6, C:16	0.05	18%	0.04	12%	0.02	6%
12	**F:6**	**0.05**	**18%**	**0.03**	**11%**	**0.02**	**4%**
13	F:9, C:0	0.00	-1%	-0.01	-3%	-0.02	-4%
14	F:9, C:6	0.00	-1%	0.00	0%	0.01	2%
15	F:9, C:9	0.00	2%	0.01	3%	0.01	2%
16	F:9, C:12	0.01	3%	0.01	3%	0.00	1%
17	F:9, C:16	0.03	12%	0.04	11%	0.03	9%
18	**F:9**	**0.04**	**14%**	**0.05**	**15%**	**0.04**	**10%**
19	F:12, C:0	-0.01	-2%	0.00	-2%	-0.01	-3%
20	F:12, C:6	0.00	-1%	0.00	0%	0.00	1%
21	F:12, C:9	0.00	1%	0.01	2%	0.01	3%
22	F:12, C:12	0.01	3%	0.01	4%	0.01	3%
23	F:12, C:16	0.03	13%	0.04	12%	0.04	12%
24	**F:12**	**0.04**	**15%**	**0.05**	**16%**	**0.06**	**16%**
25	F:16, C:0	-0.01	-2%	-0.01	-3%	-0.02	-6%
26	F:16, C:6	0.00	-1%	0.00	0%	0.01	2%
27	F:16, C:9	0.00	2%	0.01	3%	0.02	5%
28	F:16, C:12	0.01	5%	0.02	5%	0.02	6%
29	F:16, C:16	0.09	38%	0.11	36%	0.14	37%
30	**F:16**	**0.10**	**42%**	**0.13**	**42%**	**0.16**	**45%**
31	ρ_{tf}	**0.25**	**100%**	**0.31**	**100%**	**0.36**	**100%**

Table A3.2: Decomposition of the intergenerational educational correlation coefficient for mother (ρ_{tm}): 1960-1989 cohorts

Line	Family Type	1960-1969		1970-1979		1980-1989	
		$r_t(c,m)$	$\frac{r_t(c,m)}{\rho_{tm}}$	$r_t(c,m)$	$\frac{r_t(c,m)}{\rho_{tm}}$	$r_t(c,m)$	$\frac{r_t(c,m)}{\rho_{tm}}$
1	M:0, C:0	0.06	42%	0.09	42%	0.14	43%
2	M:0, C:6	0.01	6%	0.00	-1%	-0.02	-6%
3	M:0, C:9	-0.01	-5%	-0.01	-6%	-0.02	-6%
4	M:0, C:12	-0.02	-11%	-0.01	-7%	-0.01	-3%
5	M:0, C:16	-0.04	-30%	-0.05	-23%	-0.05	-16%
6	**M:0**	**0.00**	**3%**	**0.01**	**5%**	**0.03**	**11%**
7	M:6, C:0	-0.01	-6%	-0.01	-7%	-0.02	-8%
8	M:6, C:6	0.00	-3%	0.00	1%	0.01	3%
9	M:6, C:9	0.01	4%	0.02	7%	0.02	5%
10	M:6, C:12	0.01	10%	0.01	7%	0.01	4%
11	M:6, C:16	0.06	44%	0.06	30%	0.05	15%
12	**M:6**	**0.07**	**49%**	**0.08**	**38%**	**0.06**	**19%**
13	M:9, C:0	0.00	-2%	0.00	0%	-0.01	-2%
14	M:9, C:6	0.00	0%	0.00	0%	0.00	1%
15	M:9, C:9	0.00	1%	0.00	2%	0.01	3%
16	M:9, C:12	0.00	1%	0.01	3%	0.01	2%
17	M:9, C:16	0.02	12%	0.03	15%	0.04	13%
18	**M:9**	**0.02**	**13%**	**0.04**	**20%**	**0.05**	**17%**
19	M:12, C:0	0.00	-1%	0.00	-1%	0.00	-1%
20	M:12, C:6	0.00	0%	0.00	0%	0.00	1%
21	M:12, C:9	0.00	1%	0.00	1%	0.00	1%
22	M:12, C:12	0.01	4%	0.00	1%	0.01	2%
23	M:12, C:16	0.02	11%	0.03	14%	0.03	10%
24	**M:12**	**0.02**	**14%**	**0.03**	**16%**	**0.04**	**13%**
25	M:16, C:0	0.00	0%	0.00	-1%	0.00	-1%
26	M:16, C:6	0.00	0%	0.00	0%	0.00	1%
27	M:16, C:9	0.00	0%	0.00	1%	0.00	1%
28	M:16, C:12	0.00	3%	0.00	2%	0.01	3%
29	M:16, C:16	0.02	18%	0.04	20%	0.12	36%
30	**M:16**	**0.03**	**20%**	**0.04**	**21%**	**0.13**	**41%**
31	ρ_{tm}	**0.14**	**100%**	**0.20**	**100%**	**0.32**	**100%**

4. NIGHTTIME LIGHT AS A PROXY FOR HUMAN DEVELOPMENT IN IRAQ

4.1 Introduction

Decades of turmoil have defined Iraq's recent history, starting with the Iran-Iraq War in the 1980s, the occupation of Kuwait, and severe economic sanctions in the 1990s. Subsequently, the US-led invasion in 2003, followed by sectarian violence and the fight against the Islamic State of Iraq and Syria (ISIS), further exacerbated the situation. These conflicts have left Iraq with inadequate infrastructure, weakened institutions, and a complex socio-political landscape. These consequences wield significant influence, directly impacting the lives of Iraqi citizens, depriving them of essential services and hindering their ability to live with dignity. Consequently, it is imperative for the nation to enhance its recovery processes, with a focus on strengthening its trajectory of human development. Therefore, the systematic monitoring and evaluation of human development indicators across various regions or provinces become crucial tasks.

The precise examination of regional human development and the assessment of how policies and events affect cities and regions face a significant obstacle due to the absence of consistent subnational data sets. The Iraqi government has historically shown limited dedication to the measurement and accumulation of data pertaining to human development and other socio-economic facets. As an illustration, governmental collaboration with international organizations has yielded only a modest number of socioeconomic surveys. The execution of surveys within Iraq is hindered by a multitude of challenges, including security threats, financial constraints, economic instability, ongoing conflict, and widespread displacement, rendering the process arduous and complex (World Bank, 2021).

Hence, it's crucial to explore alternative methodological approaches to thoroughly examine various socioeconomic dimensions and foster human development across the nation. This study aims to identify a more suitable, precise, and accessible method for assessing human development. I utilize satellite-derived luminosity data, which serves as an accepted indicator of economic activity. Increased luminosity in specific regions often signals higher levels of industrialization, urbanization, and overall economic progress. This investigation delves into the correlation between nighttime luminosity data and human development indicators. The primary objective of this study is to evaluate the efficacy of nighttime luminosity data as a proxy for assessing key indicators of human development, such as health, education, and economic conditions, across Iraqi provinces.

Nighttime Light (NTL) data may emerge as a superior option, notably in regions like Iraq where challenges such as data scarcity and the absence of reliable subnational data persist. The key advantages of NTL data include consistent quality measurements across countries, independent of institutional capacities, and immunity to politically motivated manipulation. In addition, an updated monthly and annually version of this data for all the world are usually published and it can also be used for the national and subnational studies. Moreover, NTL images can directly demonstrate the influences of sudden circumstances on the different places in the county through variation of the light intensity. For example, Li et al. (2018) conducted research during the ISIS conflict, utilized the Visible Infrared Imaging Radiometer Suite (VIIRS) monthly night-time light images as a valuable data source to assess and quantify the humanitarian crises stemming from the conflict in Iraq. On the other hand, the human development Index (HDI) uses fixed indicators that may not effectively reflect sudden changes. For instance, areas within countries undergoing rapid development or encountering sudden obstacles may not be fully captured by the HDI. Dey, Ray , & Majumder (2022) state

that the current methodology of the HDI does not allow for the inclusion of the impacts of sudden shocks and hazards on society, such as the ongoing COVID-19 pandemic or environmental disasters like tropical cyclones. The outcomes of the unexpected circumstances may not have direct influences on the HDI (Lashmar, 2018).

In this study, I analyze regional data encompassing all provinces of Iraq spanning from 2013 to 2020. My methodology involved integrating annual global VIIRS nighttime lights data with the HDI; comprehensive definitions and descriptions of these variables will be provided in the data section. Employing both ordinary least squares (OLS) incorporating fixed effects and Arellano and Bond's (1991) differenced generalized method of moments (DGMM) estimation techniques, I identify a robust, positive correlation between nighttime luminosity and human development, which was both statistically significant and consistent across various methodologies. As discerned from the comprehensive analysis conducted within this study, a 1 percent increase in nighttime lights intensity is positively associated with a noteworthy enhancement of 0.03 percentage points in human development in Iraq. My investigation extends beyond economic development to explore whether nighttime lights can serve as a proxy for other facets of human development at the local scale. Unlike previous studies, such as Li et al. (2018), which utilized NTL data to assess the impact of the ISIS conflict on specific Iraqi provinces, interpreting reductions in light emissions as indicators of conflict-related disruptions. My affirmative findings confirm that nighttime lights not only mirror economic growth or political instability but also align with other dimensions of human development, including household wealth, education, and health. In essence, higher-intensity nighttime lights correspond to relatively affluent, well-educated, and healthy local populations.

The forthcoming sections of this chapter are structured in the following manner: Section 4.2 provides an extensive review of scholarly works concerning the utilization of nighttime luminosity data within socioeconomic research, with a particular focus on studies conducted within the context of Iraq. Section 4.3 provides a comprehensive overview of the dataset employed in this study. The methodology employed, accompanied by the resultant findings, is expounded upon in Section 4.4, culminating in the presentation of conclusions in Section 4.5.

4.2 Literature Review

The utilization of Nighttime Lights (NTL) satellite imagery in socioeconomic research has experienced substantial expansion over the past two decades, encompassing a variety of subjects, including estimating gross domestic product (Doll, Muller, & Morley, 2006; Sutton, Elvidge, & Ghosh, 2007; Henderson, Storeygard , & Weil, 2012; Li , Ge , & Chen, 2013; Bickenbach, Bode, Nunnenkamp, & Söder, 2016; P´erez-Sindín, Chen, & Prishchepov, 2021), poverty (Noor, Alegana, Gething, Tatem , & Snow, 2008; Elvidge, et al., 2009; Wang, Cheng, & Zhang, 2012; Yu, et al., 2015), analysis of regional and ethnic disparities (Holder and Raschky, 2014; Michalopoulos & Papaioannou, 2014) and armed conflict (Agnew, Gillespie, & Gonzalez, 2008; Li & Li, 2014; Li, Zhang, Huang , & Li, 2015).

There is a paucity of research examining the relationship between nighttime light density and human development indicators. In this context, I present three notable endeavors in this area, conducted by Elvidge, Baugh, Anderson, & Sutton (2012), Bruederle & Hodler (2018), and Charris, Velilla, & Chaves (2019). Elvidge, Baugh, Anderson, & Sutton (2012) utilized nighttime lights data from the 2006 US Air Force Defense Meteorological Satellite Program (DMSP) Operational Linescan System (OLS) to develop the Night Light Development Index

(NLDI), a metric solely based on satellite imagery and population density and calculated from the Lorenz Curve to assess human development independently of monetary indicators. Notably, highly developed nations typically exhibit lower NLDI values, while less developed countries tend to have higher values, Iraq has a notably high NLDI value of 0.813. Relying only on population density for the construction of the NLDI and subsequently comparing it to the national level of HDI, without considering subnational HDI data, may lead to significant challenges and result in an inaccurate representation of development indicators, especially at the subnational level. This limitation is particularly evident when analyzing the subnational NLDI heat map for Iraq, as presented in this study. Bruederle & Hodler (2018) examine the use of nighttime lights as a proxy for economic and human development in regions lacking detailed data. They used Demographic and Health Surveys from 29 African countries, the study finds a positive link between nighttime lights and indicators of local development like household wealth, education, and health. This suggests that nighttime lights can reliably represent not just economic activity but also broader aspects of human development at the local level, aiding studies on subnational differences in development. The study by Charris, Velilla, & Chaves (2019) investigates the relationship between satellite images of light density and Municipality Human Development Index (MHDI) data across Brazilian municipalities from 1991 to 2010. Employing satellite-derived data on night luminosity from DMSP/OLS and HDI data sourced from the United Nations Development Program (UNDP). Their findings reveal that municipalities with higher nighttime lights intensity tend to have better MHDI. The study explores potential mechanisms underlying this association, finding that areas with more illuminated lights also report better schooling outcomes, lower infant mortality rates, and higher levels of local economic activity. These results suggest that nighttime lights can serve as a reliable proxy for socioeconomic indicators

at the subnational level in developing countries. Although DMSP data have been widely used in academic studies in the past, encompassing the aforementioned three instances, VIIRS is typically favored due to its superior resolution, heightened sensitivity, broader spectral coverage, sustained temporal consistency, and supplementary data accessibility.

Studies employing nighttime light imagery in Iraq are limited and have primarily focused on examining the impact of political instability and armed conflicts on the affected areas. Agnew, Gillespie, & Gonzalez, (2008) utilize DMSP data, specifically nighttime light images of Baghdad and other cities in Iraq. They aim to assess if the increase in the US military presence in Baghdad in 2007 has had a beneficial effect on the general quality of daily life, as evidenced by an either increased or stable nighttime light pattern in the city. Li, Zhang, Huang, and Li (2015) utilized night-time light imagery to identify the ISIS offensive launched against cities and provinces under their control in Iraq during 2014. In a subsequent study by Li et al. (2018), this research highlighted the efficacy of VIIRS monthly night-time light images as a valuable data source for tracking humanitarian crises resulting from the ISIS conflict in the region.

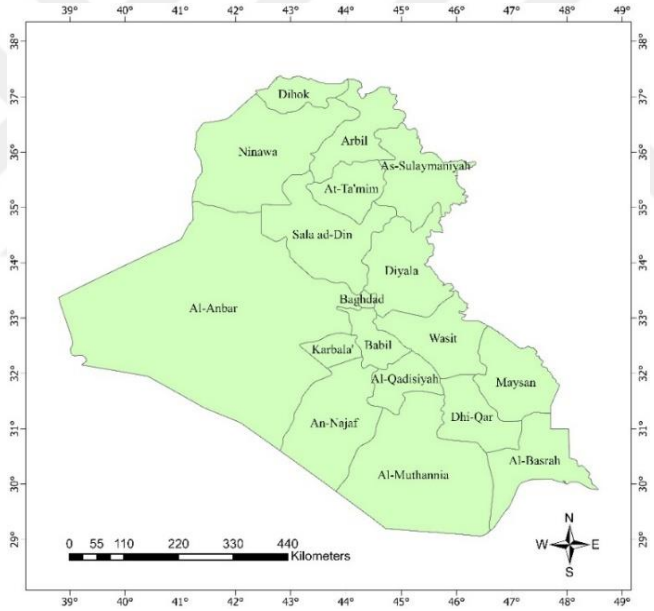
This study represents a pioneering effort to leverage NTL data to assess critical indicators of human development, including health, education, and economic conditions. Distinguishing itself from previous attempts, this research undertakes a subnational analysis using NTL data alongside the HDI data for each province, thereby facilitating more precise and nuanced insights at the provincial level. Furthermore, unlike most prior studies that primarily relied on the DMSP-OLS dataset, this study employs the VIIRS dataset, which offers enhanced spatial resolution and radiometric sensitivity, making it better suited for capturing finer variations in development indicators across subnational regions.

4.3 Data

4.3.1 Provinces Boundary

Iraq had a population of 45,407,895 million as of 2024, as reported by the Iraqi government's Center Statistical Organization. The country is bordered by Turkey to the north, Iran to the east, the Persian Gulf and Kuwait to the southeast, Saudi Arabia to the south, Jordan to the southwest, and Syria to the west. Iraq is territorially segmented into 18 administrative provinces, with the delineation of their borders depicted in ***Figure 4.1***[7].

Figure 4.1: Administrative map of Iraq.



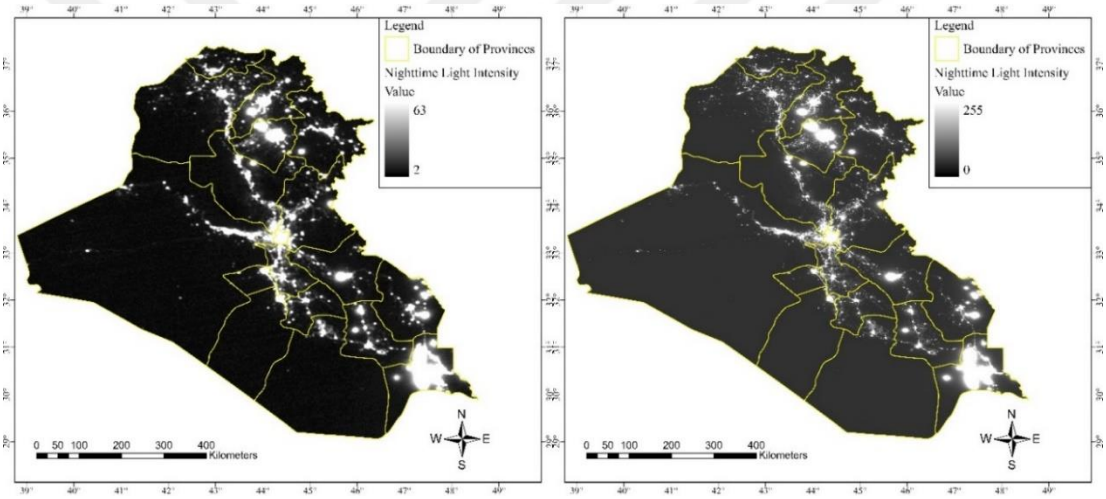
4.3.2 Nighttime Lights Data

The first nighttime image data was collected by satellites from the US Department of Defense, commencing in the mid-1960s for the purpose of assessing global cloud cover. Subsequently, these data were declassified and disclosed as the Defense Meteorological Satellite Program Operational Linescan System (DMSP-OLS). The National Oceanic and

[7] The graphical representation is derived from data sourced from the Global Administrative Areas website, available at http://www.gadm.org/.

Atmospheric Administration (NOAA) compiled an annual global night-time lights time series product using OLS data and digitally accessible data is available from 1992 to 2013. Each satellite captures images of every location on Earth 14 times per night, occurring between 20:30 and 22:00 in local time. The recorded data is stored as digital numbers (DN) with a pixel resolution of 30 arc-seconds, ranging from 0 to 63. A value of 0 signifies no light, while 63 corresponds to the highest recorded luminosity (Chen & Nordhaus, 2011).

Figure 4.2: Nighttime light images of Iraq in 2013: (a) DMSP, (b) VIIRS.



(a) **(b)**

In 2011, The National Aeronautics and Space Administration (NASA) and NOAA launched the Suomi National Polar-orbiting Partnership (SNPP) satellite, featuring the Visible Infrared Imaging Radiometer Suite (VIIRS) sensor, also known as Suomi NPP/VIIRS. This satellite sensor stands out as the preferred choice among scholars for a diverse array of research applications due to its advanced technology, superior resolution, broader spectral range, and improved radiometric properties compared to DMSP imagery (Li, Zhang, Huang , & Li, 2015; Elvidge C. D., Baugh, Zhizhin, Chi Hsu, & Ghosh, 2017). This contrast is readily discernible upon initial inspection of both image sets, as illustrated in ***Figure 4.2***. To ensure

the attainment of more precise and reliable results, I have opted to utilize VIIRS images in this study[8].

In this study, I utilized the production of an annual global VIIRS nighttime lights series (2013–2020), specifically the V2 version, as an extension of the earlier V1 annual products from 2015 and 2016. It was created by Elvidge and his colleagues, utilizing monthly averages of radiance free from cloud cover. The dataset comprises radiance values measured in nanoWatts per square centimeter per steradian (nanoWatt/cm²/sr), and unlike DMSP, the recorded data range for Iraq spans from 0 to 255 (Elvidge, Zhizhin , Ghosh, Hsu , & Taneja, 2021). In this investigation, the processing of the nighttime light image file into digital numeric representation facilitated through the utilization of QGIS version 30.32.3 and ArcGIS Pro version 2.8.4 software platforms.

4.3.3 Human Development Index

The information regarding the Human Development Index (HDI) for every Iraqi province was sourced from The Global Data Lab (GDL), which operates as an independent data and research center affiliated with the Nijmegen School of Management at Radboud University[9]. Leveraging over 500 household survey datasets sourced from major data providers focusing on low- and middle-income countries (LMICs), GDL has established one of the most extensive databases for LMICs. This database encompasses information on more than 35 million individuals, conducted between 1990 and 2020 in over 130 countries. The significant contribution of GDL involves providing information for LMICs, not only on a national scale but also at the subnational level by compiling original household data and making

[8] VIIRS nighttime light data was sourced from the Earth Observation Group, Payne Institute for Public Policy, Colorado School of Mines website. Accessible at https://eogdata.mines.edu/products/vnl/.
[9] The HDI data sourced from the Subnational HDI Database of the Global Data Lab, accessible at https://globaldatalab.org/shdi/, version v7.0.

extrapolations using the most reliable available information. In 2018, GDL crafted a subnational rendition of the United Nations Development Program's (UNDP) Human Development Index (HDI). The lab presently encompasses more than 100 subnational indicators, spanning over 1400 areas across the developing world (Smits & Permanyer , 2019). ***Table 4.1*** offers an overview of the summary statistics pertaining to all variables within our dataset.

Table 4.1: Summary statistics.

Variables (and unit)	Obs.	Mean	Std. Dev.	Min.	Max.
HDI (rate)	144	0.673	0.023	0.614	0.715
Nighttime Light (DN)	144	54.300	46.520	21.967	243.565
Population density (per km^2)	144	939.080	3381.881	11.345	16178.88

4.4 Empirical Methodology and Results

The inception of my empirical inquiry entails an examination of the relationship between the HDI and luminosity at the provincial level from 2013-2020, employing the ordinary least squares (OLS) method with fixed effects. Subsequent to the Hausman test, the results advocate for the utilization of the fixed effects model over random effects. ***Appendix 4.1*** provides the details regarding the Hausman test results. The specification of our OLS model manifests as a concise linear regression, presented herewith:

$$\boldsymbol{HDI_{pt} = \alpha_{pt} + \beta\, In\, NTL_{pt} + \gamma\, In\, Pop_{pt} + \delta_p + \epsilon_{pt}} \qquad \textbf{(1)}$$

where $\boldsymbol{HDI_{pt}}$ is the human development index of province *p* in year *t*. The focal independent variable in our investigation is logarithm of nighttime light of province *p* in year *t* ($\boldsymbol{In\, NTL_{pt}}$), representing the mean luminous intensity in province *i*. Our regression models

include logarithm of population density as a controlled variable ($\boldsymbol{In\ Pop_{pt}}$) [10]. The model incorporates the fixed effects for each province ($\boldsymbol{\delta_p}$), which mitigate the influence of imperceptible time-invariant factors, such as geographic characteristics, capable of confounding our estimated coefficient. $\boldsymbol{\epsilon_{pt}}$ is an observation-specific error term.

In order to enhance the robustness of outcomes derived from the (OLS_Fixed Effect) technique, I employ linear generalized method of moments (GMM) estimators to assess the impacts of nocturnal luminosity. These estimators are particularly suited for our panel data, characterized by a temporal duration that is comparatively smaller than the number of provinces, thereby ensuring a more precise analysis. The GMM empirical equation is extended as follows:

$$\boldsymbol{HDI_{pt} = \alpha_1 HDI_{pt-1} + \alpha_2 HDI_{pt-2} + \beta\ In\ NTL_{pt} + \gamma\ In\ Pop_{pt} + \eta_p + \epsilon_{pt}} \quad \textbf{(2)}$$

where $\boldsymbol{\eta_p}$ is an unobserved time-invariant, province-specific effect. Within our analytical framework, persistent country-specific traits (fixed effects), such as geographical features, might exhibit correlations with the independent variables. Consequently, I employ the Arellano and Bond (1991) and the differenced generalized method of moments (DGMM) estimator, as suggested by Holtz-Eakin et al. (1988). I first differenced the variables to address residual autocorrelation, wherein lagged values of the dependent variable are incorporated to account for dynamic effects. In lieu of employing exogenous instruments, the second lag of the dependent variable utilized as an instrumental variable, thereby alleviating concerns related to simultaneity bias. Furthermore, the GMM Estimator affords researchers the capability to rectify issues pertaining to serial correlation, heteroskedasticity, and

[10] The data of population for all years is not available because population census in Iraq was not conducted consistently. The available data of population is taken from different reports in Authority of Statistics and Geographic Information System and interpolated for the missing years. Retrieved from https://www.cosit.gov.iq/ar/pop-main/manpower.

endogeneity inherent in certain variables. The first difference formulation of Equation (2) can be rewritten as follows:

$$\Delta HDI_{pt} = \alpha_1 \Delta HDI_{pt-1} + \alpha_2 \Delta HDI_{pt-2} + \beta \Delta\, In\, NTL_{pt} + \gamma\, \Delta In\, Pop_{pt} + \Delta \epsilon_{pt} \qquad (3)$$

Table 4.2 encapsulates the estimation outcomes for the HDI, employing varied specifications of equations (1) and (3). In a general context, the estimated coefficients reveal a robust and positively correlated relationship between night lights intensity and HDI. In the ensuing table, each method is explicated, commencing with the presentation of estimation outcomes devoid of the inclusion of the control variable (population density), followed by its incorporation. The initial two columns delineate the findings of Ordinary Least Squares (OLS)-Fixed Effect estimations. Despite the Hausman test signaling a preference for the Fixed Effect method over the Random Effect, the results of the latter are nevertheless presented in Column (III) and (IV). Ultimately, the outcomes of Arellano-Bond DGMM estimations are illustrated in the last two columns.

From the findings presented in the first two columns ***Table 4.2***, which delineate the outcomes of the OLS with fixed effects estimation, a robust and positively significant correlation emerges between nighttime lights and human development. The primary estimation (column 1) elucidates that, when NTL is considered as the exclusive independent variable with respect to HDI, a 1 percent escalation in nighttime lights intensity correlates with a significant 0.05 percent increase in HDI. However, upon the inclusion of population density into the model, the coefficients of NTL decreased because population absorb some coefficient power of NTL, the coefficient of the NTL variable diminishing to 0.03. This coefficient suggests that a one-fold increase in NTLs is associated with a 3 percent increase in HDI, after accounting

for population density. Such an increase corresponds to a six-step rise in Iraq's HDI country ranking, with its 2021 HDI score improving from 0.673 to 0.703[11].

Table 4.2: The results of estimations.

Dependent Variable: Δ HDI	(I) OLS Fixed Effects	(II) OLS Fixed Effects	(III) OLS Random Effects	(IV) OLS Random Effects	(V) Arellano-Bond DGMM	(VI) Arellano-Bond DGMM
Δ HDI (t-1)	-	-	-	-	2.956*** (0.031)	4.462*** (0.128)
Δ HDI (t-2)	-	-	-	-	-2.708*** (0.033)	-3.483*** (0.136)
Δ Nighttime Light	0.051*** (0.004)	0.028*** (0.008)	0.044*** (0.004)	0.048*** (0.004)	0.020*** (0.001)	0.032*** (0.001)
Δ Population Density	-	0.076*** (0.021)	-	-0.006* (0.004)	-	-0.224*** (0.008)
Constant	0.478*** (0.017)	0.199* (0.081)	0.505*** (0.016)	0.517*** (0.016)	-	-
R-squared	0.878	0.889	0.449	0.457	-	-
Wald chi-squared Prob > F	0.000	0.000	0.000	0.000	0.000	0.000
Durbin-Watson stat	1.643	1.413	1.210	1.295	-	-
Arellano-Bond: AR (2)	-	-	-	-	0.841	0.483
Hansen Test (p-value)	-	-	-	-	0.282	0.377
Number of Groups	18	18	18	18	18	18
Observations	144	144	144	144	90	90

Notes: Standard errors are in parentheses. ***, **, and * denote statistical significance at 0.1%, 1% and 5% levels.

As depicted in ***Table 4.2***, the identification of second lags as instrumental variables for dependent variables is contingent upon the outcomes derived from both the Hansen test and the Arellano–Bond Serial Correlation test. The Hansen test reveals a P-values that satisfying Roodman's criterion of surpassing 0.25 yet remaining below 1.0, as per the guidelines articulated by Roodman (2009). This finding attests to the absence of correlation between error terms and instrumental variables, thereby affirming the established validity of the instrument. Furthermore, the absence of autocorrelation at the second lag is affirmed, with

[11] The Human Development Index (HDI) ranking is compiled by the United Nations Development Programme (UNDP). Retrieved from https://hdr.undp.org/data-center/country-insights#/ranks

the Arellano–Bond test yielding a value exceeding 0.1. In accordance with Arellano-Bond DGMM estimations, a discernible positive and statistically significant correlation is identified between nighttime lights and human development. Specifically, a 1 percent escalation in night lights intensity is concomitant with a statistically significant uptick of 0.02 percentage points in the HDI prior to the inclusion of controlling variables. Furthermore, following the introduction of population density as a controlling variable, the HDI registers an additional increase of 0.03 percent. The incorporation of a lagged HDI within the DGMM estimation serves to elucidate short-term persistence, thereby suggesting a significant role for historical preceding behaviors in shaping the present behavior of the dependent variable (Piper, 2023). The coefficients of the observed coefficient values for HDI (t-1) and HDI (t-2) are statistically significant and greater than one, indicating strong persistence. This implies that the current value of the HDI is greatly impacted by its previous values.

The ISIS conflict from 2014 to 2017, which displaced nearly 6 million Iraqis (IOM, 2024), likely explains the discrepancy in the population density coefficients on HDI between the fixed effects and DGMM approaches. This large-scale displacement led to abrupt population density shifts, with some areas experiencing sharp declines as people fled, while others faced sudden increases as they received displaced populations. The fixed effects estimation, which assumes a stable relationship, may show a positive coefficient because it does not account for these dynamic changes. In contrast, DGMM captures the complex effects of this displacement on HDI, revealing a negative coefficient for population density, as influxes in host regions likely strained resources, services, and infrastructure, negatively impacting HDI. Thus, DGMM's dynamic approach reflects how conflict-induced density fluctuations adversely affected HDI, aligning with the challenges faced by host regions in accommodating displaced populations.

The findings of this study align with Amartya Sen's Capability Approach, which emphasizes the need to expand individuals' capabilities to live lives they consider meaningful. This involves providing access to education, healthcare, economic opportunities, social inclusion, and more—three of which are key components of the human development index (Sen, 2000; Kuklys & Robeyns, 2005). Enhanced nighttime lighting in areas correlates with improved access to education, healthcare, and economic opportunities, facilitating knowledge acquisition, better health outcomes, and avenues for employment and entrepreneurship. By considering these dimensions of human capabilities, this research underscores the significance of infrastructure and urban planning in fostering human development and improving the well-being of individuals and communities. Furthermore, this aligns with the tenets of New Economic Geography (NEG) theory propounded by Paul Krugman. NEG theory suggests that economic activities tend to cluster in specific regions, leading to agglomeration effects that drive growth and development (Krugman, 1991). The presence of higher nighttime light levels indicates increased economic activity, reflecting the agglomeration predicted by NEG theory. This concentration of economic activity is likely to result in the development of infrastructure, services, and opportunities, contributing to higher HDI scores.

4.5 Conclusion

Nighttime luminosity, as deduced from meteorological satellite recordings, is increasingly utilized by social scientists as a surrogate metric for gauging economic activity or developmental progress within regions where granular data from official statistical agencies are scarce. Specifically concerning Iraq, this metric has been employed to monitor the aftermath of recent conflicts on affected locales. This study delves into the interplay between

local nighttime light and human development in Iraq, utilizing annual global VIIRS nighttime luminosity data alongside the Human Development Index. Employing both Ordinary Least Squares (OLS) with Fixed Effects and Arellano and Bond's (1991) Difference Generalized Method of Moments (DGMM) estimation techniques, this study contributes to the existing literature by corroborating the notion that nighttime luminosity serves as a viable proxy for assessing subnational human development. The analysis underscores a robust positive correlation between the intensity of nocturnal luminosity and HDI levels in Iraq.

The positive results validate the notion that nighttime illumination serves as a reflection of various aspects of human development, such as economic prosperity, educational attainment, and well-being. In other words, areas with brighter nighttime lights tend to be associated with more affluent, educated, and healthy communities. Furthermore, this discovery highlights that in the absence of reliable data sources, and the use of fixed standards by the HDI may not adequately capture rapid or unexpected changes. Future studies investigating subnational differences in human development and its related dimensions could make effective use of night-time light data as a viable proxy, providing a direct measure of the impact of sudden events across different regions of the country. The enduring consequences of events spanning the past four decades have left a profound imprint, directly impacting the lives of Iraqi citizens. According to the World Bank (2017), persistent violence and instability during this period have hampered progress in human development and service provision in Iraq. This study advocates for the utilization of nighttime luminosity as a valuable tool for governmental monitoring, facilitating the identification of regions in need of additional services and resources.

The nighttime light data could be used as a barometer for gauging urban expansion and associated activities has become increasingly prevalent (Mellander, Lobo, Stolarick, &

Matheson, 2015). A prospective avenue for scholarly exploration lies in the utilization of such data to scrutinize the dynamics of urbanization in Iraq, a nation marked by profound transformations driven by political instability and rapid population growth. Over the past century, the urban population in Iraq has undergone a remarkable transition, surging from a modest 25 percent in 1930 to a substantial 71 percent by 2020, propelled by a complex interplay of factors including rural-to-urban migration, forced displacement, and protracted ethnic and sectarian conflicts (Hassan, 2023).

Appendix 4.1: Hausman Test Results

To determine the appropriate model specification for our panel data analysis, I conducted a Hausman Test. The test evaluates whether the fixed effects or random effects model is more suitable by comparing the consistency of the random effects estimator with the fixed effects estimator. The null hypothesis posits that the random effects estimator is consistent, while the alternative hypothesis suggests that the fixed effects estimator is appropriate due to systematic differences in coefficients (Hausman, 1978).

Table A4.1: Hausman test results

Test	Chi-Square Statistic	Degree of Freedom	p-value	Conclusion
Hausman Test	27.344	2	0.000	Reject the Null Hypothesis; Fixed model is preferred

The results of the Hausman Test yielded a chi-square statistic of 27.344 with 2 degrees of freedom and a p-value of 0.000. Since the p-value is less than the 0.05 threshold, I reject the null hypothesis and conclude that the fixed effects model is more suitable for our analysis. This outcome implies that the random effects estimator is inconsistent, and the fixed effects approach provides more reliable results for our dataset.

5. CONCLUSION

This thesis examines the determinants of family poverty in Iraq by conducting separate analyses based on different categories, including national, regional, and economic sector classifications. It underscores the significance of educational attainment as a crucial determinant of the economic status of individuals and families. This thesis subsequently investigates trends in intergenerational educational mobility in Iraq as a critical indicator of equality of opportunity and a critical factor in poverty reduction, as emphasized in Chapter Two. It provides a comprehensive exploration of educational mobility patterns across national, regional, and gender dimensions. Ultimately, it introduces a robust methodology for evaluating human development by leveraging satellite-derived luminosity data as a proxy for assessing essential indicators, such as health, education, and economic conditions.

National-level findings indicate that higher educational attainment of the family head, female-headed families, access to food rations, families with heads in the government sector or self-employed, and urban or Kurdistan Region of Iraq (KRI) residency are associated with lower poverty rates. In contrast, larger family sizes, higher dependency ratios, families with heads working in the private or agricultural sectors, and rural residency increase poverty risk. The analysis highlights regional variations, showing that education has a lesser impact in KRI, where family size and dependency ratios also matter less. Government food rations effectively alleviate poverty in KRI but not in the Rest of Iraq (RI). Although the employment of the family head in the government sector or self-employment reduces family poverty in both regions, their effects are more pronounced in RI. Additionally, educational attainment is more effective in reducing poverty for households headed by working in the government sector compared to those in the private sector. In families led by individuals working in the private sector, larger family size and higher dependency ratios significantly increase the

likelihood of poverty, while food distribution programs provide essential support to these households.

The examination of intergenerational educational mobility in Iraq reveals a concerning trend: despite an initially high level of educational mobility, there has been a noticeable decline over time for both fathers and mothers to their descendants. This decline is accompanied by a marked polarization in the transmission of education. It suggests that descendants from less educated or disadvantaged backgrounds are likely to remain in similar circumstances, while those from highly educated or privileged families often retain their elevated levels of educational attainment. Furthermore, the analysis indicates that conflicts and political instability have disproportionately affected families with lower educational backgrounds, resulting in a greater prevalence of uneducated or less educated descendants. Notable disparities in educational persistence exist among Iraq's provinces, which may attribute to variations in government educational policies and differing ethnic attitudes toward education. Educational mobility tends to be greater and more consistent among mothers and their descendants than among fathers and theirs. Moreover, while significant gender disparities are evident with educational mobility is generally greater for sons than for daughters, female descendants have shown significant improvements in their educational attainment.

Finally, this thesis employs various methods to establish a robust and statistically significant positive correlation between nighttime luminosity and human development, consistent across different analytical approaches. The comprehensive analysis indicates that a 1 percent increase in nighttime light intensity is associated with an enhancement of 0.03 percentage points in human development in Iraq. This increase translates to a six-step improvement in Iraq's Human Development Index (HDI) ranking, with the 2021 HDI score. The findings affirm that nighttime luminosity not only reflects economic growth but also correlates with

other dimensions of human development, including household wealth, education, and health. Thus, higher levels of nighttime light intensity are indicative of relatively affluent, well-educated, and healthy local populations.

This thesis recommends that the government should address the challenges of the rentier economy by seeking to diversify the economy. By reducing its heavy reliance on resource-based revenues, especially oil, and promoting sectors such as manufacturing, agriculture, and services, the country can foster more sustainable economic growth. In addition, targeted policies to promote private sector development–through improving regulatory frameworks, access to credit, infrastructure investment, and workforce skills development–are critical to build a more resilient and diversified economy that expands employment opportunities and enhances job creation. In addition, it is essential to reform and more precisely target subsidy programs, such as PDS and SPN, to ensure they provide more effective support to the most vulnerable families and individuals. Furthermore, the government should focus on enhancing the mobility and returns to educational attainment by increasing and effectively allocating funding to the education sector, along with enacting necessary reforms. Special attention should be given to provinces that are more vulnerable and exhibit lower enrollment rates, with particular emphasis on female populations as a disadvantaged group. Consequently, these implementations may curb the increasing intergenerational educational persistence and contribute to reducing gender inequalities in educational mobility.

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ABSTRACT

This thesis provides a comprehensive analysis of critical socio-economic issues in Iraq by examining family poverty, educational mobility, and human development through three interconnected studies, each contributing unique insights to the field. The first study explores an in-depth analysis of the determinants of family poverty in Iraq by conducting separate analyses based on different categories, including national, regional, and economic sector classifications. This research utilizes data from the second Iraq Household Socio-Economic Survey (IHSES 2012) and applying logistic regression analysis. Findings at the national level suggest that higher educational attainment of the household head, female-headed households, access to food rations, and employment in the government or self-employment sectors, as well as urban or KRI residency, are associated with reduced family poverty. Conversely, larger family size, higher dependency ratios, employment in the private or agricultural sectors, and rural residency are linked to increased poverty risk. The analysis further highlights regional and sectoral variations in the effectiveness of these determinants, with factors such as household head education, family size, dependency ratios, and food rations exhibiting differential impacts based on the family's region of residence and the economic sector of the household head's employment.

This thesis subsequently investigates trends in intergenerational educational mobility in Iraq as a critical indicator of equality of opportunity and a critical factor in poverty reduction. It pioneers an examination of intergenerational educational mobility in Iraq, focusing on cohorts from 1960 to 1989, and employs data from the IHSES 2012. It provides a comprehensive analysis of intergenerational educational mobility across national, subnational, and gender-specific dimensions. The findings reveal a high level of intergenerational educational mobility from parents to their descendants, yet indicate a

discernible diminishing trend over time. It further decomposes the intergenerational correlation, revealing a persistent polarization effect. It means that descendants from less educated or disadvantaged families are more likely to remain in a disadvantaged position, while those from highly educated or privileged families often retain their elevated levels of educational attainment. Notably, while educational mobility is higher between parents and sons compared to daughters, there is a marked improvement in the educational attainment of female descendants. The regional analysis demonstrates that the persistence of education varies significantly across Iraqi provinces.

Ultimately, this thesis introduces a robust methodology for evaluating human development by leveraging satellite-derived luminosity data as a proxy for assessing essential indicators, such as health, education, and economic conditions, across Iraqi provinces from 2013 to 2020. Iraq's history of conflict has led to damaged infrastructure, weakened institutions, and a challenging socio-political environment, impacting citizens' access to basic services. To support recovery and improve human development, it is essential to systematically monitor and evaluate key development indicators across provinces. This research integrates nighttime lights data from the Visible Infrared Imaging Radiometer Suite (VIIRS) with the Human Development Index (HDI). Using both ordinary least squares (OLS) with fixed effects and the difference generalized method of Moments (DGMM) techniques, the analysis reveals a strong, positive correlation between nighttime luminosity and human development. The findings confirm that areas with higher-intensity nighttime lights are indicative of more affluent, well-educated, and healthier populations.

Keywords: Determinants of poverty; binary logistic regression; family poverty; intergenerational mobility; education; correlation coefficient decomposition; gendered educational mobility; nighttime luminosity; HDI; VIIRS; Iraq

ÖZET

Bu tez, Irak'ta aile yoksulluğu, eğitimsel hareketlilik ve insani gelişmeyi üç özgün ve birbiriyle bağlantılı çalışma aracılığıyla incelemektedir. İlk çalışma, Irak'taki aile yoksulluğunun belirleyicilerini, ulusal, bölgesel ve ekonomik sektör sınıflandırmaları dahil olmak üzere farklı kategorilere dayalı ayrı analizler yaparak incelemektedir. İkinci çalışma, fırsat eşitliğinin kritik bir göstergesi olarak Irak'taki nesiller arası eğitimsel hareketlilik eğilimlerini araştırmaktadır. Bu bölüm, eğitimsel hareketlilik örüntülerini ulusal, bölgesel ve cinsiyet boyutları üzerinden kapsamlı bir şekilde ele almaktadır. Son olarak, insani gelişmeyi değerlendirmek için uydu kaynaklı aydınlanma verilerinin sağlık, eğitim ve ekonomik koşullar gibi temel göstergeleri değerlendirmek amacıyla bir vekil değişken olarak kullanıldığı bir metodoloji sunulmaktadır.

İlk çalışma, Irak'taki aile yoksulluğunun belirleyicilerini, ulusal, bölgesel ve ekonomik sektör sınıflandırmaları dahil olmak üzere farklı kategorilere dayalı ayrı analizler yaparak incelemektedir. Bu çalışmada, Irak Hanehalkı Sosyo-Ekonomik Araştırması'nın (IHSES 2012) ikinci turundan elde edilen veriler kullanılmaktadır. Ailelerin yoksul olarak sınıflandırılma olasılığını etkileyen çeşitli açıklayıcı değişkenlerin etkisini değerlendirmek için lojistik regresyon tekniği uygulanmaktadır. Mutlak yoksulluk kavramı, yoksul ve yoksul olmayan aileleri ayırt etmek için kullanılmakta ve mutlak yoksulluk sınırı, Irak Planlama Bakanlığı ile Dünya Bankası uzmanlarının işbirliğiyle tanımlanmaktadır. Irak'taki hanehalkı yoksulluğu bağlamında kapsamlı bir literatür taramasına dayanarak, aile yoksulluğuna katkıda bulunan faktörleri analiz etmek için on beş açıklayıcı değişken seçilmiştir.

Aile yoksulluğunu etkileyen faktörlere ilişkin ulusal düzeydeki bulgular, daha yüksek eğitim seviyesinin yoksulluk olasılığını azalttığını ve bu etkinin kırsal alanlarda kentsel bölgelere

kıyasla daha belirgin olduğunu göstermektedir. Eğitimin yoksulluğu azaltma potansiyeli olsa da, Irak'ın çatışmalardan etkilenen durumu ve eğitim sektörünün kronik yetersiz finansmanı nedeniyle bu etkisi nispeten sınırlıdır. Bulgular ayrıca, kadınların başında bulunduğu hanelerin daha düşük yoksulluk oranlarına sahip olduğunu, buna karşın daha büyük aile büyüklüklerinin ve daha yüksek bağımlılık oranlarının artan yoksullukla ilişkili olduğunu ortaya koymaktadır. Ev sahipliği, yoksulluk riskini azaltma ile pozitif bir ilişkiye sahiptir. Irak Kamu Dağıtım Sistemi (PDS) kapsamında sağlanan gıda yardımının genel yoksulluk oranları üzerinde önemli bir etkisi olmamakla birlikte, kırsal alanlarda yoksulluğun azaltılmasında daha etkili olduğu görülmüştür. Çalışma, ayrıca, hane reisi istihdam durumunun önemine dikkat çekmektedir; kamu sektörü veya serbest meslek, özel sektör veya ücretli işlere kıyasla daha düşük yoksulluk oranları ile ilişkilidir. Bu etkinin kırsal bölgelerde kentsel alanlara göre daha güçlü olduğu tespit edilmiştir. Bunun yanı sıra, tarım sektöründe çalışan hanelerin, tarım dışı sektörlerde çalışanlara kıyasla daha yüksek yoksulluk seviyelerine sahip olduğu ortaya konmuştur. Kentsel yerleşim ve Kürt Özerk Bölgesi'nde (KRI) yaşamak, yoksulluk olasılığını azaltmakla ilişkilidir ve bu durum bölgesel yoksulluk risklerindeki farklılıkları ortaya koymaktadır.

Irak, Kürt Özerk Bölgesi (KRI) ve Geri Kalan Irak (RI) olarak kategorize edildiğinde, eğitim düzeyinin yoksulluğu azaltma üzerindeki etkisinin KRI'da, RI'a kıyasla anlamlı ölçüde daha az belirgin olduğu görülmektedir. KRI'da aile büyüklüğünün ve bağımlılık oranlarının yoksulluk üzerindeki etkisi, RI'a kıyasla daha düşüktür. Hükümet tarafından dağıtılan gıda yardımları KRI'da yoksulluğu etkili bir şekilde azaltırken, RI'da bu etkinin anlamlı olmadığı gözlemlenmiştir. Kamu sektöründe istihdam veya serbest meslek, her iki bölgede de yoksulluğu azaltmaktadır; ancak bu etkinin RI'da KRI'ya göre daha güçlü olduğu tespit

edilmiştir. Ayrıca, kentsel yerleşim her iki bölgede de yoksulluk olasılığını azaltmakla birlikte, bu etkinin RI'da KRI'ya kıyasla daha belirgin olduğu ortaya çıkmıştır.

Bu çalışma ayrıca, hane reisinin çalıştığı sektöre bağlı olarak aile yoksulluğunu etkileyen faktörleri incelemektedir. Bulgular, eğitimin yoksulluğu azaltma üzerindeki etkisinin, kamu sektöründe çalışan bireylerin yönettiği haneler için, özel sektörde çalışanların yönettiği hanelere kıyasla belirgin ölçüde daha büyük olduğunu ortaya koymaktadır. Aile büyüklüğü ve bağımlılık oranının, özel sektör çalışanlarının yönettiği hanelerde yoksulluk olasılığını artırma konusunda önemli bir etkisi bulunmakta; ancak bu etkinin diğer sektörlerde daha az belirgin olduğu tespit edilmiştir. Ayrıca, gıda dağıtım programı, özel sektör çalışanları için yoksulluğu önemli ölçüde azaltmakta, ancak diğer istihdam sektörleri için anlamlı bir etkisi bulunmamaktadır.

Bu çalışmanın bulguları, Irak'ta yoksulluğu azaltmayı hedefleyen politika yapıcılar için değerli içgörüler sunmaktadır. Eğitimin yoksulluğu azaltmadaki etkisinin artırılmasının hayati öneme sahip olduğu açıktır. Eğitimin yoksullukla mücadeledeki sınırlı etkinliği, büyük ölçüde, ardışık hükümetler tarafından uygulanan, uzun vadeli strateji ve politikalardan yoksun kısa vadeli sosyal programlardan kaynaklanmaktadır. Genellikle seçim kaygılarıyla motive edilen bu kısa vadeli önlemler, kamu eğitiminin kalitesini zayıflatan yetersiz bütçe tahsisatlarını yansıtmakta ve eğitimi hükümetin bir önceliği haline getirmemektedir. Sonuç olarak, eğitim kalitesindeki bu bozulma, eğitimin yoksulluğu azaltma potansiyelini azaltmaktadır (Tilak, 2002). Bu sorunun ele alınabilmesi için, özellikle güney bölgeler gibi daha kırılgan ve düşük okullaşma oranlarına sahip illerde, eğitim sektörüne yönelik fonların önemli ölçüde artırılması gerekmektedir. Çabalar, okul altyapısını genişleterek ve burs imkânları sağlayarak kaliteli eğitime erişimi artırmaya, öğretmen gelişimine, müfredat güncellemelerine ve gerekli kaynaklara yatırım yaparak eğitim kalitesini iyileştirmeye, ve

yetişkin eğitimi ile mesleki eğitim yoluyla yaşam boyu öğrenmeyi teşvik etmeye odaklanmalıdır.

Hükümetin yoksulluğu azaltmaya yönelik çabaları belli bir etki yaratmış olsa da, bu etkiler, ayrılan büyük bütçelere kıyasla görece sınırlı kalmıştır. Her yıl hükümet bütçesinin önemli bir kısmı, Sağlık ve Eğitim gibi temel sektörlerden çok daha fazla fon alan Kamu Dağıtım Sistemi (PDS) ve Sosyal Koruma Ağı'na (SPN) tahsis edilmektedir. Örneğin, Irak'ın 2023 federal bütçe yasasında SPN'ye yaklaşık 4,75 milyar dolar ve PDS'ye 1,15 milyar dolar tahsis edilirken, eğitim sektörüne yapılan yatırım için yalnızca 390 bin dolar ayrılmıştır. Dünya Bankası'nın 2018 raporuna göre, bu programlara yapılan geniş kapsamlı harcamalara rağmen, PDS ciddi verimsizliklerle boğuşmakta ve SPN'nin sosyal transferleri hedef kitleye yeterince ulaşmamaktadır (World Bank, 2011; 2018). Bu nedenle, bu programların en savunmasız aileler ve bireyleri daha iyi desteklemek için reforme edilmesi ve daha etkili bir şekilde hedeflenmesi gereklidir. Ayrıca, çalışmanın bağımlılık oranları ile ilgili bulguları önemli politika çıkarımlarını vurgulamaktadır. Yüksek bağımlılık oranlarının, aileler üzerinde önemli mali yükler oluşturduğu ve bu durumun yoksulluktan kurtulma yeteneklerini zorlaştırdığı görülmektedir. Bu zorlukların üstesinden gelebilmek için, politika yapıcıların, kamu kreşleri gibi uygun fiyatlı çocuk bakımına erişimi artırması ve uygun fiyatlı huzurevleri gibi yaşlı bakım hizmetlerini iyileştirmesi gerekmektedir.

Irak'taki işgücü piyasasının zorlukları, istihdamda, eğitimde veya herhangi bir eğitim programında yer almayan gençlerin (NEET) yüksek oranlarıyla daha da kötüleşmektedir. Bu durum, iş arayanların sayısının mevcut iş olanaklarını aştığı kritik bir uyumsuzluğu ortaya koyan Pigeonhole (Güvercin Yuvası) İlkesi ile benzerlik göstermektedir. Johann Peter Gustav Lejeune Dirichlet tarafından 1834 yılında ortaya atılan bu ilke, "güvercin yuvalarının" (iş olanaklarının) yetersiz olması durumunda fazlalık "güvercinlerin"

(çalışanların) ekonomik zorluklarla karşı karşıya kalacağını vurgular (Rittaud & Heeffer, 2014; ILO, 2018). Bu sorunun çözülmesi için hükümet, inşaat, tarım, tarıma dayalı sanayi ve mesleki beceri geliştirme alanlarına yönelik büyük ölçekli yatırımlarla istihdam yaratmaya odaklanan kısa vadeli stratejileri derhal uygulamalıdır. Bu sektörler, özellikle gençler ve kadınlar gibi savunmasız gruplar için önemli istihdam fırsatları sunabilir (Bandiera et al., 2019). Bu stratejik yaklaşım, iş arzını artan taleple uyumlu hale getirerek işsizliği hafifletebilir, yoksulluğu azaltabilir ve acil eylem ile uzun vadeli planlamanın önemini bir kez daha vurgular.

İkinci çalışma, 1960-1989 yıllarını kapsayan kuşaklara odaklanarak Irak'ta kuşaklar arası eğitim hareketliliğine yönelik öncü bir araştırmayı temsil etmektedir. Bu çalışmada, aynı zamanda IHSES 2012 verilerini de kullanıyorum. Araştırma, sekiz yıl süren Irak-İran savaşı ve ardından gelen siyasi ve ekonomik istikrarsızlıktan doğrudan etkilenen bireyleri ele almaktadır. Irak'taki yüksek düzeydeki eğitim hareketliliğine rağmen, belirli dönemde hem babalar hem de anneler ile onların çocukları arasında hareketlilikte düşüş eğilimi gözlemlenmiştir. Annelerden çocuklarına aktarılan eğitim hareketliliği, babalarınkini aşarak daha hızlı ve kalıcı bir eğilim sergilemektedir.

Ayrıştırma analizi bulguları, Irak'ta eğitimin kuşaklar arası aktarımında yüksek derecede bir kutuplaşmayı ortaya koymaktadır. Bu durum, daha az eğitimli veya dezavantajlı ailelerden gelen bireylerin dezavantajlı konumlarını sürdürme olasılıklarının yüksek olduğunu, buna karşılık daha avantajlı ailelerden gelenlerin ise olumlu statülerini koruma eğiliminde olduklarını göstermektedir. Ayrıca, analiz, çatışmaların ve siyasi istikrarsızlıkların daha düşük eğitim seviyesine sahip aileler üzerinde orantısız şekilde olumsuz etkiler yarattığını, bu durumun da eğitimsiz veya düşük eğitimli ebeveynlere sahip bireylerin katkısını artırdığını işaret etmektedir.

Eğitimsel hareketliliği her bölge için bağımsız olarak tüm dönem boyunca hesapladım. Irak'taki bölgeler arasında eğitimsel sürekliliğin seviyesi önemli ölçüde farklılık göstermektedir ve bu farklılıklar iki faktöre dayandırılabilir: Hükümetin farklı illere yönelik eğitim politikalarındaki değişkenlik ve etnik gruplar arasındaki eğitim anlayışlarındaki farklar. Ayrıca, bu çalışma, ebeveynlerden oğullara ve kızlara doğru olan eğitimsel hareketliliğin cinsiyet temelli farklılıklarını araştırmakta olup, Irak'ta belirgin bir cinsiyet eşitsizliğini ortaya koymaktadır. Bulgularımız, kuşaklar arası eğitimsel bağın kızlar için erkeklere kıyasla daha kalıcı olma eğiliminde olduğunu göstermektedir. Bu durum, ebeveynler ile oğullar arasındaki eğitimsel hareketliliğin, ebeveynler ile kızlar arasındaki hareketliliğe kıyasla belirgin şekilde daha yüksek olduğunu göstermektedir. Aksine, kız çocukların eğitim seviyesinde kayda değer bir iyileşme gözlemlenmiş olup, ebeveynlerin kızlarıyla olan eğitimsel hareketlilikteki azalan eğilim, oğullarıyla olandan daha az belirgindir. Bu modele katkıda bulunan iki ana faktör şunlardır: Birincisi, kadınların erkeklere kıyasla çatışmalar ve savaş durumlarından daha az etkilendikleri, bu durumun, birçok erkek öğrencinin askere alınması ve okuldan çekilmesiyle ilişkili olduğu görülmektedir. İkincisi, 1970'lerdeki ücretsiz eğitim, zorunlu eğitim ve okuryazarlık karşıtı kampanya politikalarının kadınlar üzerinde daha olumlu bir etkisi olmuştur.

Bu araştırma, eğitimin geleceğini güvence altına almak ve bir sonraki nesil için daha iyi eğitimsel hareketliliği teşvik etmek amacıyla, Irak hükümetindeki politika yapıcılarının kuşaklar arası artan eğitimsel sürekliliği ve cinsiyet dengesizliklerini ele almalarının çok önemli olduğunu önermektedir. Bu, kamu eğitim sektörü için desteklerin güçlendirilmesi ve kadın ve erkek bireyler için yüksek kaliteli eğitim fırsatlarına tarafsız erişimin garanti altına alınmasını gerektirmektedir. Eğitim sektörüne yapılan yatırımlar için ayrılan bütçenin artırılması ve verimli bir şekilde kullanılması zorunludur; çünkü mevcut durumda bu bütçe,

ulusal bütçenin yalnızca yüzde 5'ini oluşturmaktadır. Ayrıca, eğitimin doğrudan etkisi dışında, ebeveynlerin çocuklarına hem eğitim hem de genetik yoluyla yetenekler aktararak sağladıkları dolaylı bir etki de söz konusudur. Eğitimin dolaylı etkisi, ebeveynlerin çocuklarının eğitimiyle ilgili değişkenler üzerinde etkili olmalarını içerir; bu değişkenler, çocuklarının eğitimsel çabalarına yapılan yatırımlar ve genel eğitim ortamını kapsamaktadır (Wang, vd., 2022). Çocukların beşeri sermayesine yapılan yatırımlar, onların gelecekteki kazançlarını ve sosyoekonomik statülerini belirlemede önemli bir rol oynamaktadır. Ebeveynler, aile kültürü gibi faktörler ve beceriler, yetenekler, inançlar ve davranışları şekillendiren çeşitli parasal ve parasal olmayan yatırımlar aracılığıyla, çocuklarının yaşam boyu kazanç potansiyellerini dolaylı bir şekilde etkileyebilirler (Corak, 2013).

Üçüncü çalışma, gece zamanındaki ışıklılık ile insan gelişimi arasında farklı analitik yaklaşımlar doğrultusunda güçlü ve istatistiksel olarak anlamlı bir pozitif korelasyon kurmak için çeşitli yöntemler kullanmaktadır. Meteorolojik uydu kayıtlarından elde edilen gece zamanındaki ışıklılık, resmi istatistik kurumlarından elde edilen ayrıntılı verilerin eksik olduğu bölgelerde ekonomik faaliyet veya kalkınma ilerlemesini ölçmek için sosyal bilimciler tarafından giderek daha fazla bir ikame ölçütü olarak kullanılmaktadır. Özellikle Irak ile ilgili olarak, bu ölçüt, son çatışmaların etkilediği bölgelerdeki sonuçları izlemek amacıyla kullanılmıştır. Bu çalışma, Irak'taki yerel gece ışığı ile insan gelişimi arasındaki etkileşimi incelemekte olup, yıllık küresel VIIRS gece ışıklılık verilerini ve İnsan Gelişimi Endeksi'ni (HDI) kullanmaktadır. Hem Sabit Etkilerle Olasılık En Küçük Kareler (OLS) hem de Arellano ve Bond'un (1991) Farklar Genelleştirilmiş Moment Yöntemi (DGMM) tahmin tekniklerini kullanan bu çalışma, gece ışıklılığının, ulusal alt düzey insan gelişimini değerlendirmek için geçerli bir proxy (göstergelik ölçüt) olarak hizmet ettiğini doğrulayan

mevcut literatüre katkıda bulunmaktadır. Analiz, Irak'taki gece ışıklılığı yoğunluğu ile HDI seviyeleri arasında güçlü bir pozitif korelasyon olduğunu vurgulamaktadır.

Pozitif sonuçlar, gece ışıklılığının, ekonomik refah, eğitim düzeyi ve genel iyilik hali gibi insan gelişiminin çeşitli yönlerinin bir yansıması olarak hizmet ettiğini doğrulamaktadır. Diğer bir deyişle, daha parlak gece ışıklarıyla aydınlatılan bölgeler, genellikle daha varlıklı, eğitimli ve sağlıklı toplumlarla ilişkilendirilmektedir. Dahası, bu keşif, güvenilir veri kaynaklarının yokluğunda ve HDI'nin sabit standartlar kullanmasının, hızlı ya da beklenmedik değişimleri yeterince yakalayamayabileceğini vurgulamaktadır. İnsan gelişimi ve bununla ilgili boyutlardaki ulusal alt farkları araştıran gelecekteki çalışmalar, gece ışıklığı verilerini geçerli bir proxy olarak etkin bir şekilde kullanabilir ve ülkenin farklı bölgelerinde ani olayların etkilerini doğrudan ölçen bir araç sunabilir. Son dört on yıldır devam eden olayların kalıcı sonuçları, Irak vatandaşlarının yaşamlarını doğrudan etkileyerek derin bir iz bırakmıştır. Dünya Bankası'na (2017) göre, bu dönemdeki sürekli şiddet ve istikrarsızlık, Irak'taki insan gelişimi ve hizmet sunumunda ilerlemeyi engellemiştir. Bu çalışma, gece ışıklılığının hükümetin izleme süreçlerinde değerli bir araç olarak kullanılmasını savunmakta ve ek hizmetler ve kaynaklara ihtiyaç duyan bölgelerin belirlenmesini kolaylaştırmaktadır.

Anahtar Kelimeler: Yoksulluğun belirleyicileri; ikili lojistik regresyon; aile yoksulluğu; nesiller arası hareketlilik; eğitim; korelasyon katsayısı ayrıştırması; cinsiyete dayalı eğitim hareketliliği; gece ışığı yoğunluğu; HDI; VIIRS; Irak