

**RESEARCH ARTICLE**

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# The Role of Economic Investments in Mitigating Poverty Across Urban and Rural Kazakhstan

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## Abstract

This study employed a comprehensive analytical approach to examine the relationships between investments in healthcare, education, and other economic sectors and their impact on poverty levels in Kazakhstan in urban and rural contexts, allowing for nuanced insights into the differential impacts of investments across these settings. The analysis was structured around evaluating correlations, regression modeling, and ANOVA tests to assess the significance of the observed relationships. Results revealed significant positive correlations between investments in healthcare and education and poverty reduction, with these investments demonstrating a powerful impact in urban areas. Investments in other economic sectors, such as agriculture, industry, and construction, also showed correlations with poverty levels, underscoring the importance of integrated investment strategies. However, regional disparities in investment impacts were evident, highlighting the need for tailored approaches to address the unique challenges and opportunities in specific areas of Kazakhstan. Notably, the study identified particular regions requiring more focused attention due to fluctuations in sectoral contributions to the Gross Regional Product (GRP), variations in investment levels, and the distinct challenges rural areas face. The findings support the hypotheses that investments in healthcare and education significantly affect poverty reduction, with implications for policymakers and regional development strategies.

**Keywords:** Regional Economy, Healthcare, Education, Urban Area, Rural Area, State Budget, Socio-Economic Development

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**JEL:** E60, J01, J10, O11

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## 1. INTRODUCTION

In developing countries, there is now increasing international recognition of the importance of both the content of economic policies and the process of their implementation, especially about poverty reduction strategies. Poverty is seen as a multidimensional phenomenon affecting human life's economic, social, and cultural aspects. The leading causes of poverty include lack of capital, remote geographical location, fragile ecological environment, lack of infrastructure and public services, and political disadvantage (Bird et al., 2002). Factors such as governance, ownership, participation, and the interactions of the four main dimensions: growth, distribution of income and assets, quality of institutions, and type of political system become the main elements of development programs (Aloui2019). Solving the problem of poverty can effectively improve national happiness and reduce the gap between the poor and the rich. The complexity of the problem of poverty requires integrated policies and strategies, such as programs to increase productive employment opportunities, strengthen human resources, and ensure access to existing socio-economic opportunities. Some countries, including Africa, Brazil, China, Costa Rica, and Indonesia, are demonstrating that rapid economic growth can lift significant numbers of people out of financial poverty. However, reducing poverty requires economic growth and social and political measures such as fiscal policy and social safety nets (Singh & Chudasama, 2020). One of the main reasons for the slow socio-economic development of poor and underdeveloped areas is the slow or ineffective development of productive factors and infrastructure construction in these areas, which makes local poverty alleviation measures extremely difficult. Poverty also contributes to environmental degradation, such as land degradation, due to low-input agriculture (Yang et al., 2020).

Thus, poverty reduction is becoming a significant focus for many countries and a primary goal for governments. With good governance and a favorable investment environment, increased fiscal expenditure can stimulate economic growth and development, which in turn can lead to poverty reduction. Breaking the cycle of spatial poverty traps requires a comprehensive approach that includes improving infrastructure, access to education and health care, creating economic opportunity, and strengthening resilience to natural disasters.

Economic development creates new jobs, increases incomes, and improves access to resources and services, which can help reduce poverty (Surya et al., 2021). One of the key ways to measure the effect of fiscal spending on poverty reduction is the change in poverty levels as a result of the measures taken (Ebenezer et al., 2021). If poverty levels decline following increases in fiscal spending on related programs and policies, this may indicate that the spending is effective.

The issue of poverty reduction remains a central challenge in global development strategies, reflecting its critical importance for enhancing the quality of life and ensuring sustainable economic growth. This study aims to examine the impact of economic development on poverty reduction processes. In the context of Kazakhstan, regional disparities and varying levels of investment across sectors present unique challenges and opportunities for poverty alleviation and economic growth. Understanding these dynamics is essential for designing targeted interventions that can effectively address poverty and foster sustainable development across different regions of the country.

The study's primary goal is to analyze the impact of investments in healthcare and education on poverty reduction, focusing on the differentiation between urban and rural areas and identifying regional disparities in Kazakhstan. GDP per capita is a measure of economic development, highlighting significant differences between countries. Higher GDP per capita correlates with lower poverty rates, highlighting the importance of economic growth in anti-poverty efforts. Economic growth is generally seen as the main driver of poverty reduction, as an increase in a country's overall output and income creates the potential to improve the population's

living standards. However, this process does not always automatically lead to poverty reduction or an equal distribution of economic benefits among different population segments.

## 2. LITERATURE REVIEW

Economic growth has a significant impact on poverty levels. When a country's economy grows, the production of goods and services increases, which should theoretically lead to the creation of new jobs and increased incomes. Ideally, this should reduce poverty as more people earn enough to meet their basic needs. Sustainable economic development thus stands out as an essential factor for poverty reduction, highlighting the need for targeted growth-oriented policies (Eisenmenger et al., 2020).

However, it is worth noting that a combination of several factors, including remote location, lack of access to markets, educational and health facilities, insufficient infrastructure, limited income opportunities and unfavorable environmental conditions can lead to the formation of “spatial poverty traps”. Christiaensen and Martin (2018) stressed that developing economic activities, such as agriculture or small-scale trade, in remote rural areas has no impact on poverty reduction. In fact, due to global trade development, local businesses are usually not in demand as foreign goods are. These are situations where certain geographic, economic, and social conditions create a cycle in which poverty is self-perpetuating and difficult to escape. Such conditions can limit the ability of residents of these areas to achieve economic growth and social development, thereby perpetuating the cycle of poverty over many generations (Zhou & Liu, 2019).

For example, remote rural areas where residents have limited access to education and healthcare due to lack of infrastructure. This results in low levels of education and poor health, which limits their ability to find decent-paying jobs outside of agriculture. Low incomes, in turn, prevent investment in children's education, which continues the cycle of poverty. Additionally, if an area is prone to environmental problems such as soil erosion or frequent natural disasters, this further deteriorates living conditions and reduces opportunities for escape from poverty (Kaiser & Barstow, 2022). At the same time, technological development and productivity growth in agriculture, industry, and services have different impacts on poverty reduction. In particular, agricultural productivity growth has been found to be generally more effective in reducing poverty compared to similar non-farm growth (Ivanic & Martin, 2018).

However, economic growth can lead to increased income inequality when the benefits of growth are unevenly distributed. This means that most of the income increase may go to the already affluent segment of the population, while the poor segments of society will not experience a significant improvement in their situation. Economic growth can reduce poverty and widen income gaps, putting economic benefits out of reach for people experiencing poverty (Amar et al., 2020).

Recent research highlights the complex interaction of socio-economic factors in shaping poverty dynamics and highlights the importance of an integrated policy approach to addressing poverty in different regional contexts. Mansi et al. (2020) suggested that tackling income inequality, promoting economic growth, and improving governance are key policy measures to reduce poverty in the EU and the Western Balkans. Unemployment has been identified as a significant factor influencing poverty, emphasizing the importance of job creation and labor market reform (Nae et al., 2024).

Regions with limited economic opportunities have high unemployment rates, influencing poverty. Education has also been highlighted as essential for increasing social mobility and economic prosperity. Investing in education is essential for long-term poverty reduction strategies. According to Dinh Thanh et al. (2020), regions with mixed economies reflected in autonomous budget management perform positive and fruitful outcomes compared to state financial transfers. Centralized budget management impacts the development of the economy,

which governments with weak institutional capacity explain as they have difficulty converting public spending into the efficient provision of public goods. However, improving the level of public health services helps narrow the gap in access to services between different regions and urban and rural areas. Public education and health services have a greater impact on poverty reduction than other public services. The importance of public investment in basic education and health care, as well as the provision of low-cost or free public services to low-income groups, reduces economic inequality and reduces regional disparities (Yang et al., 2022).

Increased economic growth reduces unemployment and poverty, which in turn increases welfare and productivity. Modern conditions provide for special attention to finance and active participation of the state. In particular, it is necessary to increase the minimum wage to improve welfare and reduce wages (Harsono, 2023). A number of studies supported that state policy in poverty reduction has been achieved through the interference of government. According to Liu et al. (2019) strategies included providing credit financing to poor households, agricultural construction, food-for-work programs, and promoting agricultural infrastructure and technology. Wang et al. (2023) noted that success in poverty reduction is impossible without attracting financial investment, especially guaranteed fiscal support. Cao et al. (2023) noted that in rural India, this has an impact on poverty levels for access to education and health care. The multidimensional nature of poverty points to the need to consider various factors when developing strategies to reduce it. Commercialization, education, health, and living standards improvements, increased agricultural productivity, improved labor utilization, and diversified livelihood options can significantly reduce multidimensional poverty. However, to effectively reduce poverty, it is necessary to consider each country's social and economic characteristics and pay attention to measures that promote social inclusion.

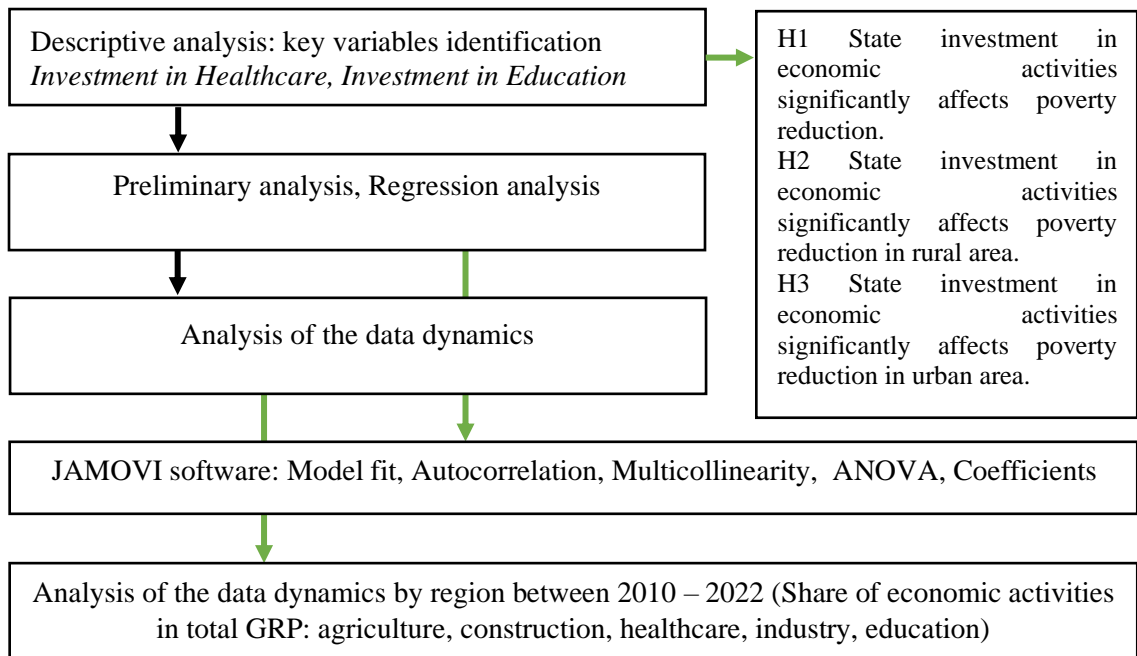
### **3. METHODOLOGY**

The analysis employs a combination of descriptive and statistical techniques to assess the relationships between various socio-economic indicators and their impact on poverty levels, with a particular focus on healthcare and education investments. It integrates both rural and urban contexts to understand these dynamics across different regions comprehensively.

Based on the conducted literature review, state investment in economic activities affects the level of poverty. Therefore, the research methodology for this study is based on the works of Harsono (2023), Wang et al. (2023), and Cao et al. (2023) There were identified critical indicators such as average income of the population ( average monthly salary) and fiscal policy ( which is reflected in state investment of social sector, including education and healthcare). Some studies stated that industrial development does not contribute to the overall poverty reduction but contributes to the wealth of an already affluent population. On the contrary, agriculture was regarded as the indicator that contributed to reducing poverty in rural areas. Furthermore, incorporating a quantitative analysis through regression models or a qualitative assessment through case studies can enrich the understanding of these dynamics.

Therefore, current research is focused on the analysis of the impact of state investment in economic activities on the overall poverty level and in the context of urban and rural areas. The research methodology includes the following stages which presented in Figure 1.

The inferential analysis used regression modeling to quantify the relationship between poverty levels and investments in healthcare and education, incorporating autocorrelation and multicollinearity checks. Three models were constructed to analyze the data in general and specifically within urban and rural settings. The significance of the models and their predictors was assessed using the coefficient of determination ( $R^2$ ), correlation coefficient ( $R$ ), F-statistics, p-values, and analysis of variance (ANOVA).



**FIGURE 1.** Research stages

*Note:* compiled by authors

#### 4. FINDINGS AND DISCUSSION

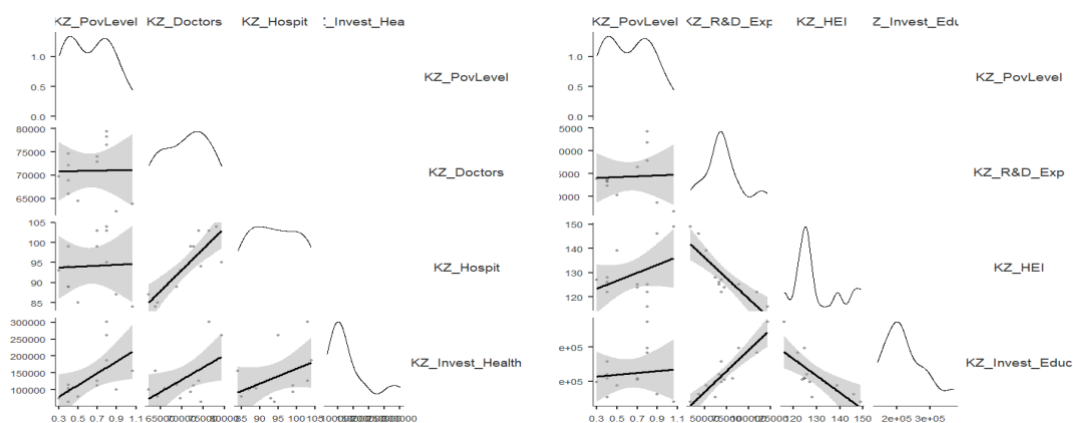
The initial phase of the analysis examines the correlations between specific indicators related to healthcare and education. Additional indicators, such as the number of doctors and hospitals, were considered for healthcare. Similarly, for education, internal expenditure on R&D and the number of higher educational institutions were included. Figure 2 shows a preliminary analysis of the correlation between indicators. There were taken healthcare and education. Two additional indicators were taken for healthcare: number of doctors and hospitals. For education, additional indicators were taken, as well as internal expenditure on R&D and a number of higher educational institutions. Nevertheless, according to the provided results, investment in health and a number of higher educational institutions have a significant positive linear correlation. In contrast, investment in education has a moderate positive correlation.

*The relationship between poverty levels and investments in health care.* There is a clear inverse relationship: as poverty levels increase, investments in health care decrease. This may indicate that poorer regions may suffer from a lack of healthcare funding.

*The relationship between the number of doctors and investments in healthcare.* There is a positive correlation: regions with many doctors have more significant investments in healthcare. This may indicate that investments are being used effectively to attract health workers.

*The relationship between the number of hospitals and investments in health care.* There is also a positive correlation: more hospitals correspond to higher investments in healthcare, which may indicate the development of healthcare infrastructure.

*Distribution of variables.* Histograms show the distribution of each variable along the diagonal. The number of doctors and hospitals is close to normal, while the distribution of poverty and investment in health care appears skewed.



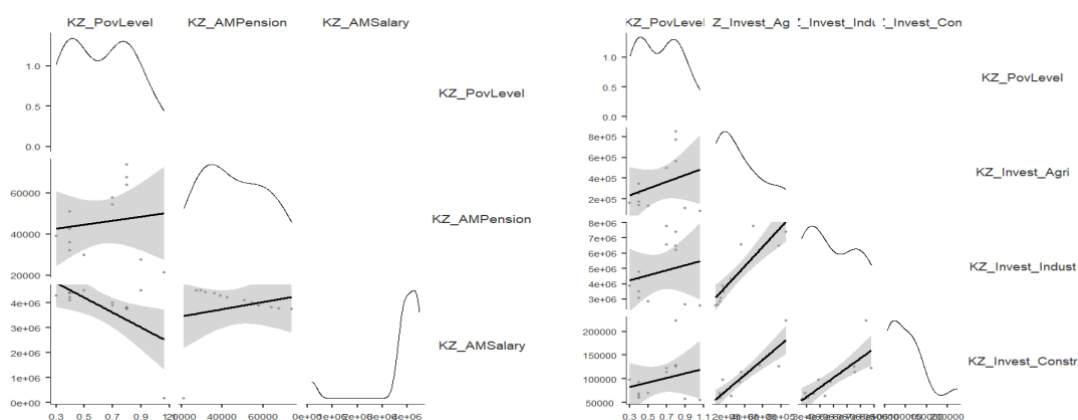
**FIGURE 2.** Descriptive Analysis Education and Healthcare

*Note:* compiled by authors

*Poverty level and domestic R&D expenditures.* The graph shows an inverse relationship: as the poverty level increases, R&D expenditures decrease. This may indicate that poorer regions need to invest more in research and development, limiting their long-term economic growth and innovation potential.

*Poverty level and number of higher education institutions.* The relationship could be clearer, but it can be assumed that as the poverty level decreases, there is an increase in the number of educational institutions. This may indicate that education is a priority in more prosperous regions.

*Poverty level and investment in education.* The graph shows an inverse relationship: poverty levels. Next, in Figure 3, there are results for the rest of the indicators: average monthly pension and salary, economic activity (industry, construction, and agriculture).



**FIGURE 3.** Descriptive analysis, Industry

*Note:* compiled by authors

*Investment and Poverty Level.* A negative relationship exists between poverty levels and agriculture, industry, and construction investment. As poverty levels increase, investment in these

sectors decreases. Because investments in agriculture are often linked to basic needs, poverty reduction may be more sensitive to changes in this sector. Higher investment in industry and construction can help create jobs and economic growth, which can help fight poverty.

*Investments between Sectors.* The graphs also show a positive correlation between investments in different economic sectors, indicating possible synergies or alignment of regional investment policies.

According to the conducted literature review, investment in economic activities is a part of fiscal policy, and therefore, it contributes to the reduction of poverty level. However, the results of descriptive analysis showed that local government provides financial support when there is an urgent need. Therefore, the poverty level increases along with state investment in construction, agriculture, and industry.

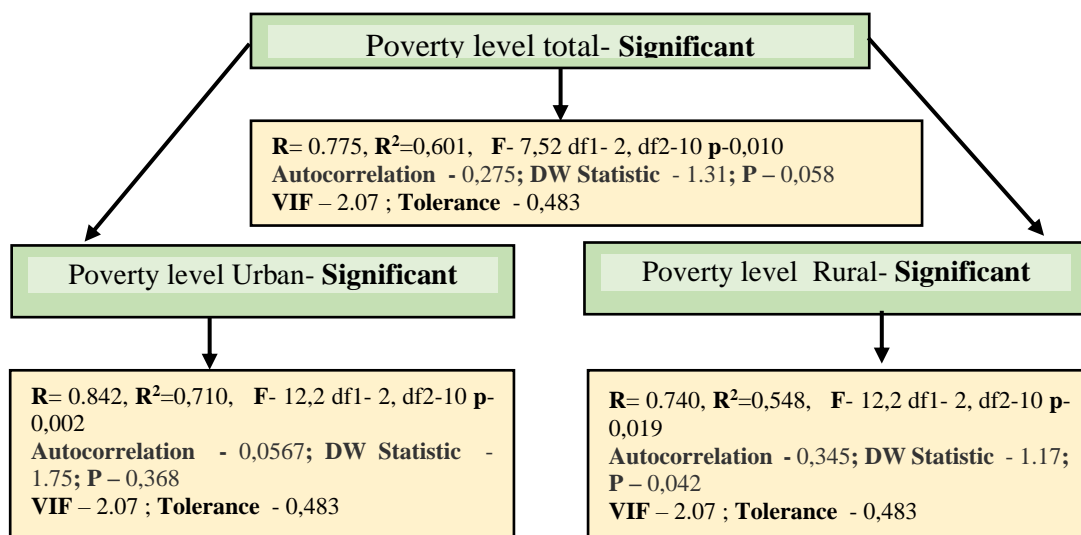
According to the descriptive analysis, two key indicators of investment in health and education were identified. Due to this, the hypotheses were corrected :

*H1: Investment in healthcare and education significantly affects poverty reduction.*

*H2: Investment in healthcare and education significantly affects poverty reduction in rural areas.*

*H3: Investment in healthcare and education significantly affects poverty reduction in an urban area.*

The regression analysis was conducted considering the context of urban and rural areas. The results for the model's fit for the relationship between poverty levels and investments in health and education are given in Figure 4.



**FIGURE 4.** Model fit

*Note:* compiled by authors

*Model 1.* The coefficient of determination ( $R^2$ ) is 0.601. This means that approximately 60.1% of the variation in the dependent variable (poverty rate) can be explained by our independent variables (investment in health and education). In the context of socio-economic research, this is a reasonably high figure, indicating a significant impact of our predictors on poverty levels.

The correlation coefficient ( $R$ ) is 0.775, indicating a strong positive relationship between the explanatory and dependent variables. This suggests that poverty levels tend to fall as investment in health and education increases. F-statistics equals 7.52 with degrees of freedom  $df1=2$  (number of predictors) and  $df2=10$  ( $N$  - number of observations - number of predictors - 1). With a p-value

of 0.010, well below the standard threshold of 0.05, we reject the null hypothesis that all coefficients on the independent variables are simultaneously equal to zero. This indicates the statistical significance of our predictors overall. The autocorrelation of errors measured using the autocorrelation coefficient (-0.275) and DW statistics (1.31) does not show apparent autocorrelation (DW close to 2), although it is on the edge of the acceptable range (1.5-2.5). The P-value for autocorrelation (0.058) also indicates that there is no statistically significant autocorrelation, although it is close to the significance threshold. Multicollinearity, assessed by VIF (2.07) and tolerance (0.483), does not appear to be a problem in this analysis. A VIF below 5 indicates the absence of serious multicollinearity, which is confirmed by a tolerance value exceeding the threshold value of 0.2. Based on the analysis, it can be concluded that investments in health and education are significantly associated with poverty, which is confirmed by both statistical tests of significance and the adequacy of the model.

*Model 2.* The results indicate an even stronger relationship between urban poverty rates and investments in health and education. The coefficient of determination ( $R^2$ ) increased to 0.710, indicating that 71% of the variation in poverty rates in urban areas can be explained through investments in health and education. This is a significant improvement over the previous analysis, highlighting the importance of these factors in an urban context. The correlation coefficient ( $R$ ) is 0.842, indicating a very strong positive relationship between the independent and dependent variables. This suggests that significant progress can be made in reducing urban poverty through increased health and education investment. The F-statistic increased to 12.2 with a p-value of 0.002, providing even more substantial evidence of the statistical significance of the model. The error autocorrelation and DW statistics show an improvement in the autocorrelation situation (DW = 1.75, which is within the acceptable range, indicating that there are no severe problems with error autocorrelation). The P-value of 0.368 for autocorrelation confirms that there is no statistically significant autocorrelation. The results highlight that investments in health and education significantly impact poverty reduction in urban areas.

*Model 3.* The coefficient of determination ( $R^2$ ) is 0.548, which means that investments in health and education can explain 54.8% of the variation in rural poverty. This indicates a significant, but not as strong, influence of these factors on the poverty level in rural areas compared to urban ones. The correlation coefficient ( $R$ ) is 0.740, indicating a strong relationship between the explanatory variables and the dependent variable, although less than in the urban context. The F-statistic has a value of 12.2 with degrees of freedom  $df_1=2$  and  $df_2=10$ , with a p-value of 0.019. This indicates the statistical significance of the model as a whole, confirming that although the impact of the predictors on poverty in rural areas is noticeable, it is less pronounced than in urban areas. Error autocorrelation, shown through an autocorrelation coefficient of 0.345 and a DW statistic of 1.17, indicates the presence of positive autocorrelation (DW well below 2). Because insignificant positive autocorrelation is quite common, we can accept this result, although it is on the border of the permissible range (1.5-2.5). The P-value of 0.042 for autocorrelation confirms the statistical significance of this effect, warranting further consideration. All models multicollinearity measures (VIF and tolerance) remain unchanged, indicating no significant multicollinearity between the predictors.

Next, ANOVA data for three models are provided, reflecting the relationship between poverty level and investments in health and education in general, in urban and rural areas, in Table 1.

*Model 1.* Investment in health significantly affects poverty with a sum of squares of 12.46, F-statistic of 14.59, and p-value of 0.003, indicating statistical significance of this predictor. Investment in education also affects poverty, but to a lesser extent, with a sum of squares of 4.43, an F-statistic of 5.19, and a p-value of 0.046, which is also statistically significant.

*Model 2.* Healthcare investment has a more significant impact in urban areas than overall, with a sum of squares of 7.292, an F-statistic of 17.01, and a p-value of 0.002. Investment in education



**TABLE 1.** ANOVA: poverty level models

Model	Predictor	Sum of Squares	df	Mean Square	F	p
Total	Investment_Healthcare	12.46	1	12.460	14.59	0.003
	Investment_Education	4.43	1	4.430	5.19	0.046
	Residuals	8.54	10	0.854		
Urban	Investment_Healthcare	7.292	1	7.292	17.01	0.002
	Investment_Education	0.490	1	0.490	1.14	0.310
	Residuals	4.286	10	0.429	17.01	
Rural	Investment_Healthcare	22.6	1	22.56	12.09	0.006
	Investment_Education	13.1	1	13.11	7.03	0.024
	Residuals	18.7	10	1.87		

Note: compiled by authors

in urban areas does not have a statistically significant effect on poverty, with an F-statistic of 1.14 and a p-value of 0.310, which is more than the alpha level of 0.05. Investment in health is essential in reducing poverty in both urban and rural areas, with the most significant impact in rural areas.

*Model 3.* Investment in rural health significantly impacts poverty, with an F-statistic of 12.09 and a p-value of 0.006. Investment in education is also significant in rural areas, with an F-statistic of 7.03 and a p-value of 0.024.

Investments in education have a more minor but still significant impact on poverty, and their impact is more pronounced in rural areas than urban areas. Residuals indicate that some unexplained variance remains in the models, particularly in rural areas, which may indicate other influencing factors.

Next, results for the models' coefficients are provided in Table 2.

**TABLE 2.** Coefficients: poverty level models

Model	Predictor	Estimate	SE	t	p
Total	Intercept	4.36	0.973	4.48	0.001
	Investment_Healthcare	2.02e-5	5.28e-6	3.82	0.003
	Investment_Education	-1.34e-5	5.89e-6	-2.28	0.046
Urban	Intercept	1.28	0.690	1.85	0.093
	Investment_Healthcare	1.54e-5	3.74e-6	4.12	0.002
	Investment_Education	-4.46e-6	4.17e-6	-1.07	0.310
Rural	Intercept	7.86	1.44	5.46	<.001
	Investment_Healthcare	2.72e-5	7.81e-6	3.48	0.006
	Investment_Education	-2.31e-5	8.71e-6	-2.65	0.024

Note: compiled by authors

*In the overall model,* the significance of investment in health is confirmed by the F-statistic of 14.59 and p-value of 0.003, indicating its high impact on poverty reduction. Investment in education also has a significant effect, although to a lesser extent, with an F-statistic of 5.19 and a p-value of 0.046, demonstrating a weak but statistically supported impact on poverty reduction.

*In the model for urban areas,* healthcare investment is even more significant, with an F-statistic of 17.01 and a p-value of 0.002, highlighting its critical role in reducing urban poverty. However, investment in education in this model did not show a statistically significant effect, as reflected in the F-statistic of 1.14 and p-value of 0.310, indicating no direct impact on poverty rates in urban areas.

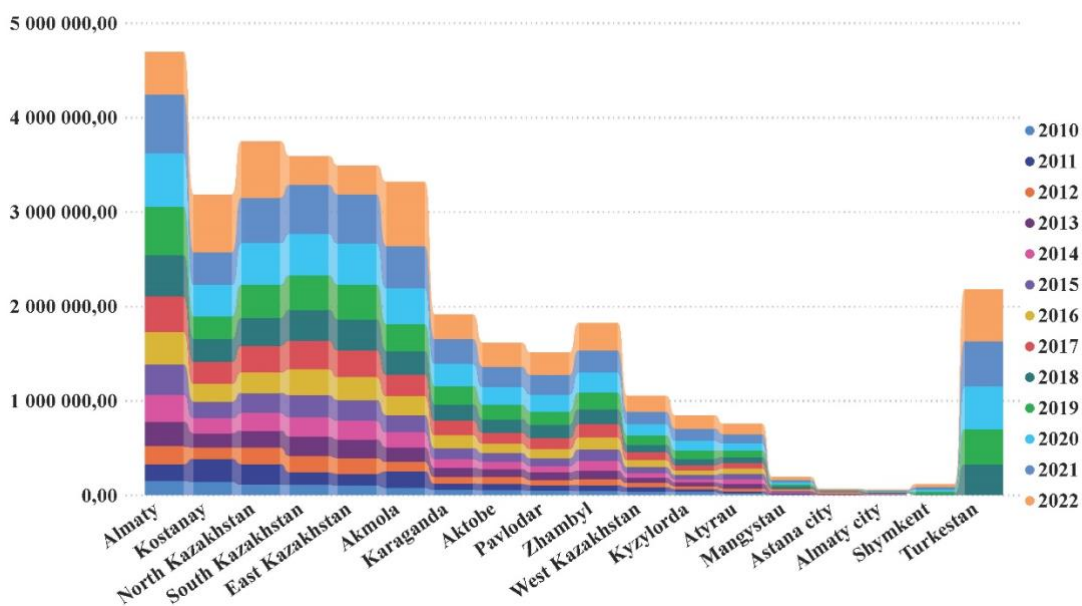
*In rural areas*, both types of investments have significantly impacted poverty reduction. Investment in health, with an F-statistic of 12.09 and p-value of 0.006, and investment in education, with an F-statistic of 7.03 and p-value of 0.024, were both confirmed to be highly significant in the rural context.

H1 Investment in healthcare and education significantly affects poverty reduction – supported.

H2 Investment in healthcare and education significantly affects poverty reduction in rural areas – supported.

H3 Investment in healthcare and education significantly affects poverty reduction in urban areas - partly supported. Investment in healthcare has an insignificant impact on the poverty level reduction in urban areas.

An analysis of the dynamics of the Gross Regional Product (GRP) in the agricultural sector of the Republic of Kazakhstan for the period from 2010 to 2022 reflects the significant growth of this sector in the country's economy (see Figure 5).



**FIGURE 5.** Share of agriculture to GRP (Kazakhstan), 2010-2022

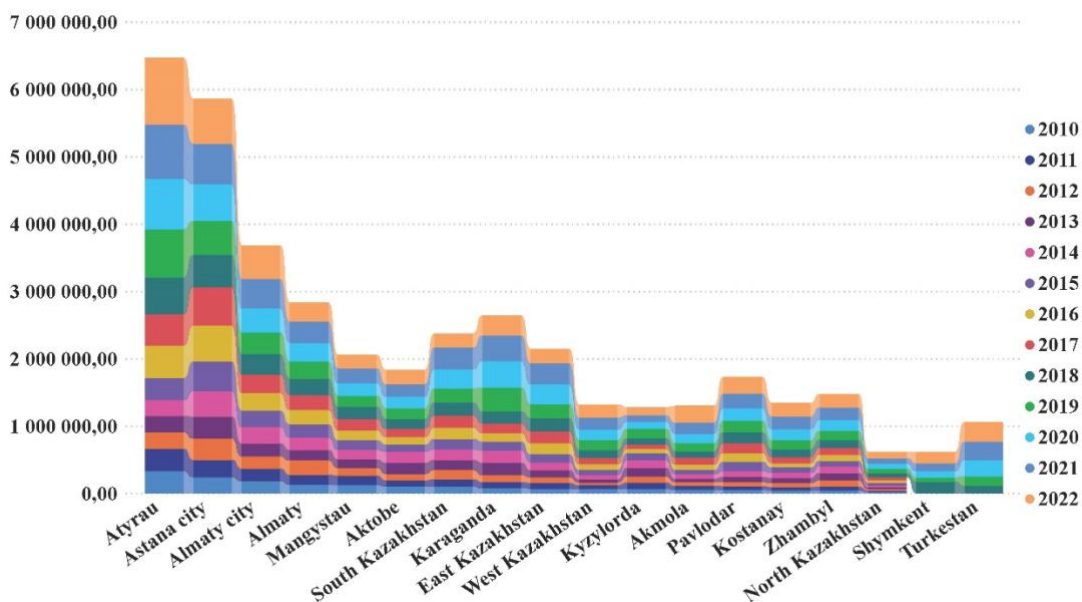
*Note:* compiled by authors

The total GRP of the agricultural sector increased from 983,994.9 billion tenge in 2010 to 4,101,844.0 billion tenge in 2022, which indicates this sector's significant contribution to the country's economic development. Almaty has seen an increase in the share of the agricultural industry from 152,470.7 billion tenge in 2010 to a peak of 620,978.6 billion tenge in 2021, followed by a decrease to 449,856.4 billion tenge in 2022. This may indicate volatility or changes in the region's GRP structure. In the West Kazakhstan region, there has been a steady increase in the share of the agricultural sector from 35,006.5 billion tenge to 168,667.9 billion tenge over the period under review, which indicates the sustainable development of this sector. In the South Kazakhstan region, there is also an increase, but in 2022, there is a sharp drop from 517,445.5 billion tenge in 2021 to 304,346.6 billion tenge, which requires additional analysis.

To assess the impact of the construction industry on the economy of the Republic of Kazakhstan in the context of gross regional product (GRP), the presented data should be analyzed

by year and region. The table displays the volumes of GRP in the construction sector in thousands of tenge from 2010 to 2022.

The volumes of the construction sector of the economy of the Republic of Kazakhstan in the context of gross regional product (GRP) are presented in Figure 6.



**FIGURE 6.** Share of construction to GRP (Kazakhstan), 2010-2022

*Note:* compiled by authors

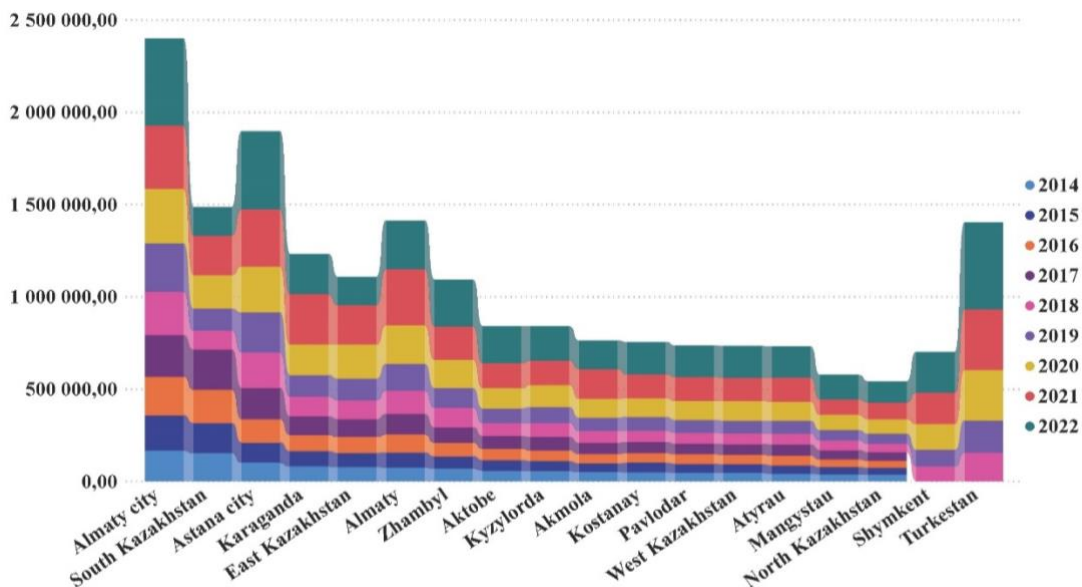
On a nationwide scale, there is a visible upward trend in the GRP of the construction industry, starting from 1,680,502.5 million tenge in 2010 and reaching a peak of 3,408,585.1 million tenge in 2020. However, in 2021, there is a decline to KZT 2,889,183.3 million, followed by a resumption of growth to KZT 3,788,406.2 million in 2022. These fluctuations may be associated with cyclical economic factors, changes in government policy in the construction sector, and foreign economic conditions. Almaty shows a constant increase from 126,989.1 million tenge in 2010 to a maximum of 313,095.2 million tenge in 2021, followed by a decrease in 2022 to 284,342.9 million tenge. This likely reflects the overall economic activity in the region, where construction plays a significant role. Atyrau shows the most pronounced growth over the entire period, from 329,459.5 million tenge in 2010 to 988,449.5 million tenge in 2022, which may be due to the active development of infrastructure and industrial projects, especially in the oil and gas sector. Karaganda is experiencing volatile growth, with a sharp peak of 356,229.0 million tenge in 2019 and a subsequent decline to 296,060.0 million tenge in 2022. This may indicate the completion of major construction projects and the transition to the operation phase of completed facilities.

Many regions, such as East Kazakhstan and South Kazakhstan, also experience significant fluctuations, which requires a detailed analysis of influencing factors such as regional economic policies, the volume of investments in capital construction, and changes in the structure of regional economies.

Kazakhstan as a whole shows a steady increase in education funding from 1,125,456.2 million tenge in 2014 to a peak of 1,769,450.5 million tenge in 2022. Notably, in 2019, there was a

decrease of 697,467.3 million tenge, followed by recovery and growth in financing. Almaty has one of the highest growth rates - from 74,081.2 million in 2014 to 263,110.8 million in 2022. This may be due to the city's development as a significant educational center of the country. Southern Kazakhstan and Eastern Kazakhstan show similar trajectories with increasing funding, with the exception of a decrease in 2022. This decline could be due to several factors, including changes in budget priorities or the completion of specific major education projects.

Changes in the volume of education financing in different regions of Kazakhstan from 2014 to 2022 are displayed in Figure 7.



**FIGURE 7.** Share of education to GRP (Kazakhstan), 2010-2022

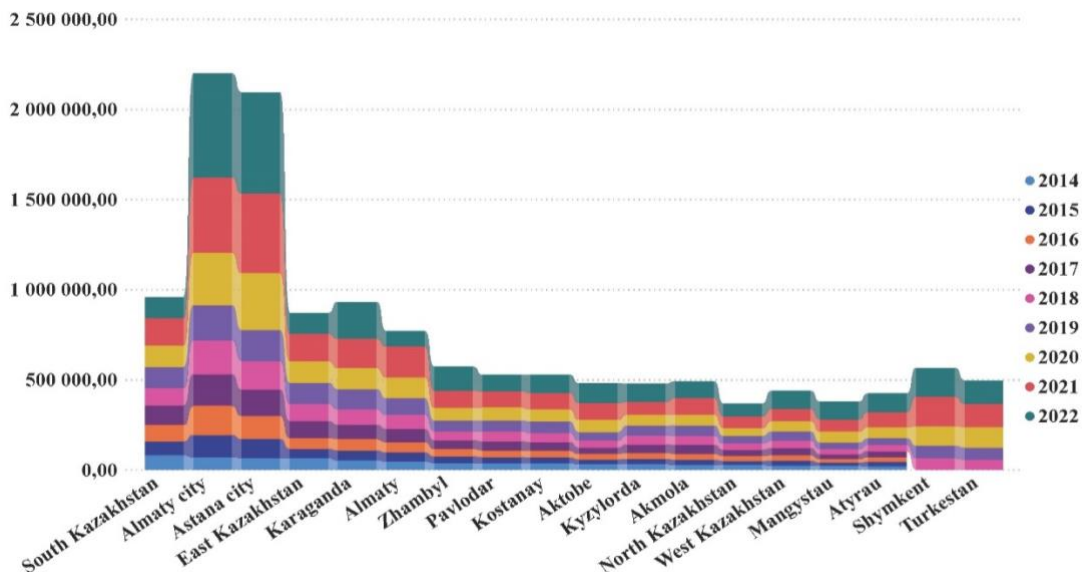
*Note:* compiled by authors

Of most significant interest are Almaty and Astana cities, where education funding shows the most tremendous increase, reaching 471,552.4 million tenge and 422,875.1 million tenge, respectively, in 2022. These data may reflect increased educational infrastructure investment in the country's capital and largest city.

The share of healthcare and social services in the GRP of the Republic of Kazakhstan grew from 666,308.4 million tenge in 2014 to a peak of 1,075,843.5 million tenge in 2017. After declining to KZT 459,961.3 million in 2019, the industry recovered to reach KZT 1,044,984.0 million in 2022, which may reflect increased public investment in health and social services or increased private spending in this area.

In Almaty, the share of healthcare in GRP also shows an increase until 2019, followed by a significant decrease to 83,574.2 million tenge in 2022. This may be due to changes in the structure of regional GRP or redistribution of budgetary resources. Astana and Almaty cities are showing significant growth in healthcare and social services investments, reaching 560,937.8 million tenge and 574,729.6 million tenge, respectively, in 2022. This underlines their status as large administrative and economic centers where the need for social services is exceptionally high. In regions such as Aktobe and West Kazakhstan region, there is also an increase in the share of healthcare in GRP, reaching 109,362.7 million tenge and 99,529.6 million tenge, respectively, by 2022.

Figure 8, provided data on the share of healthcare and social services in the gross regional product (GRP) of the Republic of Kazakhstan for the period from 2014 to 2022.



**FIGURE 8.** Share of Healthcare and Social Services to GRP (Kazakhstan), 2010–2022

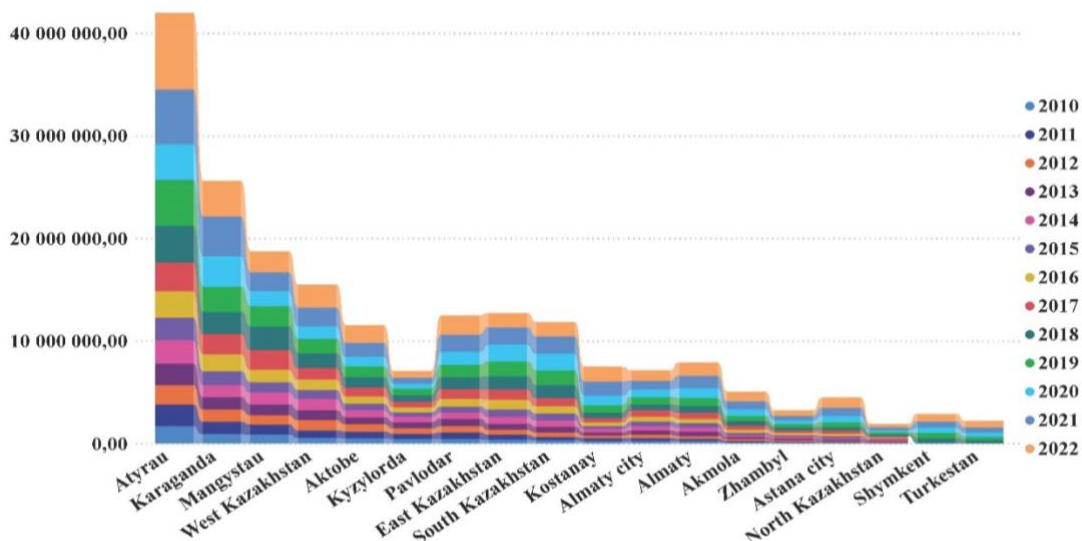
*Note:* compiled by authors

These data may reflect the strengthening of health infrastructure and population growth or rising levels of wealth, which entail increased demand for health and social services. There is a slight decrease in the share of healthcare and social services in GRP in the South Kazakhstan region from 116,830.5 million tenge in 2019 to 115,408.8 million tenge in 2022. This decline may result from several factors, including economic transitions or reorganization of the health care system.

Interestingly, Shymkent shows an increasing share of investment in healthcare and social services, reaching KZT 159,388.1 million in 2022. This may indicate the development of this region as a new center for the provision of quality medical services.

The share of industry in the gross regional product (GRP) of various regions from 2010 to 2022 is shown in Figure 9.

The share of industry in the country's GRP shows steady positive dynamics, starting from 7,177,125.8 million tenge in 2010 and reaching 20,293,589.1 million tenge by 2022, which reflects the strategic development of the industrial sector in the country's economy. Atyrau stands out among other regions as a leader in the GRP industry share, which is likely due to the development of the oil and gas industry, large industrial projects, and infrastructure. In Aktobe and the West Kazakhstan region, there is a significant increase in industry in the structure of GRP, which may be due to the development of the metallurgical, mechanical engineering, and mining industries. Karaganda is traditionally known for its industrial capacity, especially in the mining industry, which is reflected in the high share of industry in the region's GRP. Almaty city and Astana show an increase in the industrial sector's share in GRP, which may be a consequence of the expansion of the industrial base and efforts to diversify the economy, including through the development of high-tech industries.



**FIGURE 9.** Share of Industry to GRP (Kazakhstan), 2010–2022

*Note:* compiled by authors

Healthcare and education investments are significantly associated with poverty reduction, highlighting the critical role of these sectors in socio-economic development. The impact of healthcare and education investments on poverty reduction is more pronounced in urban areas ( $R^2 = 0.710$ ) compared to rural areas ( $R^2 = 0.548$ ), suggesting that urban settings may offer more leverage for these investments to influence poverty levels.

Positive correlations were observed between investments in different economic sectors (agriculture, industry, and construction), indicating synergies or alignment of investment policies. However, investments in these sectors tend to decrease with increasing poverty levels, emphasizing the need for targeted fiscal policies to support impoverished regions. The analysis reveals significant regional disparities in the contributions of agriculture, construction, education, healthcare, and industrial sectors to Kazakhstan's Gross Regional Product (GRP) from 2010 to 2022. While investments in health and education significantly impact poverty reduction, their effectiveness is less pronounced in rural areas than in urban settings.

## 6. CONCLUSIONS

These research findings illustrate not only the importance of investments in health and education as tools for poverty reduction but also the differences in their impact depending on the regional context. The identified differentiation in the impact of predictors between urban and rural areas highlights the need to develop targeted policy measures tailored to the specifics and needs of each environment.

Based on the analysis, several regions in Kazakhstan require more focused attention due to their specific challenges and opportunities in poverty reduction and regional development.

Despite significant increases in investments in healthcare, education, and agriculture, Almaty experienced a decrease in the share of the agricultural sector in 2022 and a decline in the construction sector's GRP. These fluctuations may indicate volatility in the regional economy, requiring targeted interventions to stabilize and promote sustainable growth. Additionally, the high growth rates in education funding reflect its development as a significant educational center,

suggesting further investment could bolster this advantage. In recent years, there has been a considerable decrease in healthcare and social services' share of GRP in Almaty. This decline could impact public health outcomes and social welfare, necessitating focused interventions to reverse the trend and ensure adequate funding and infrastructure for healthcare services.

South Kazakhstan showed a sharp drop in the agricultural sector's contribution to its GRP in 2022, alongside a decrease in education financing. Such trends may hinder long-term economic growth and innovation potential, making it imperative to investigate the underlying causes and address them through targeted fiscal and development policies.

West Kazakhstan showed a steady increase in the share of the agricultural sector, indicating sustainable development. It's essential to ensure that this growth translates into broader economic benefits for the region, including poverty reduction and job creation.

As a region showing an increasing share of investment in healthcare and social services, Shymkent represents an opportunity for development as a new center for quality medical services. Strategic investments here could enhance healthcare access and quality for the surrounding areas, contributing to overall regional development.

Policymakers should prioritize investments in healthcare and education as critical strategies for poverty reduction, focusing on maximizing the impact in both urban and rural areas. Regions showing significant growth or decline in specific sectors should explore strategies for economic diversification to stabilize and enhance regional economic development. The positive correlation between sectorial investments suggests that coherent and aligned fiscal policies can amplify the impact of these investments on poverty reduction.

Regions require a multi-faceted approach that includes enhancing infrastructure, ensuring stable and diversified economic growth, improving access to quality healthcare and education, and developing targeted fiscal policies encouraging investment and development in underperforming sectors. Such targeted strategies are vital for mitigating regional disparities, enhancing socio-economic development, and effectively reducing poverty across Kazakhstan.

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