THE JOURNAL OF DEVELOPMENT AND ADMINISTRATIVE STUDIES

Contents

Editor:

Prakash Shrestha, *Ph.D.*

Associate Professor
Tribhuvan University, Faculty of Management
Nepal Commerce Campus, Kathmandu, Nepal
email: prakash.shrestha1@ncc.tu.edu.np

Youth Employment Issues and their Impact on the Economic Development of Nepal

Laxmi Kanta Sharma, Ph.D.
Associate Professor
Centre for Economic Development and Administration (CEDA),
Tribhuvan University, Kathmandu
Email: laxmikantas@gmail.com; laxmi.sharma@ceda.tu.edu.np
https://orcid.org/0000-0003-4023-8673

Vishal Paudel, M.Phil.
Tribhuvan University, Kathmandu, Nepal
Email: revishalsearch94@gmail.com
https://orcid.org/0000-0002-3475-2249

Abstract

Youth unemployment in Nepal is a significant and persistent challenge, posing serious threats to the country's economic development and social stability. This study investigates the causes, impacts, and potential solutions to youth unemployment, specifically focusing on Kathmandu Valley. Employing qualitative methods such as interviews, focus groups, and document analysis, the research captures perspectives from unemployed youth, employers, educators, policymakers, and NGO representatives. The findings reveal a stark disconnect between the education system and labor market needs, exacerbated by outdated curricula and inadequate vocational training. Economic stagnation, societal biases favoring white-collar jobs, and insufficient support for entrepreneurship further compound the issue. The consequences of youth unemployment are extensive, ranging from lost productivity and skills erosion to financial dependency and mental health challenges among young people. The study emphasizes the urgent need for education reform, the expansion of vocational training, and the creation of policies that foster entrepreneurship and align workforce skills with market demands. By addressing these systemic barriers, Nepal can harness its youthful population as a transformative force for sustainable economic growth and social progress.

Keywords: Youth unemployment, Nepal, Education reform, Vocational training, Entrepreneurship

Introduction

Background and Context

Youth unemployment is a multifaceted issue that intersects with various economic, social, and political dimensions, significantly impacting sustainable development. As reported by the United Nations in 2022, approximately 23.5% of young people worldwide—equivalent to 289 million individuals—were not engaged in education, employment, or training (NEET). Although this marks a slight improvement from the 2020 peak, the figure is still higher than pre-pandemic levels and surpasses the 2015 baseline of 22.2%. The issue was particularly concerning in Least Developed Countries (LDCs), where informal employment reached 89.7% in 2022, showing no progress since 2015. The International Labour Organization (ILO, 2022) emphasizes that youth unemployment is a critical global challenge, particularly in developing countries where economic opportunities are often scarce, and young people face significant barriers in transitioning from education to employment. The global youth unemployment rate consistently surpasses that of adults, reflecting systemic issues such as skills mismatches, economic instability, and limited job creation, which disproportionately affect young people (ILO, 2022).

In Nepal, a country with a predominantly young population and an agrarian economy, youth unemployment is a pressing concern. The labour market in Nepal is characterized by high levels of informality, limited industrial diversification, and a significant mismatch between the skills imparted by the education system and those demanded by employers (Central Bureau of Statistics, 2023).

Addressing youth unemployment in Nepal is not merely an economic necessity; it is also critical for ensuring social stability and the country's overall development trajectory. High levels of youth unemployment can exacerbate poverty, fuel social unrest, and result in a substantial loss of economic productivity. The long-term effects of youth unemployment often referred to as the "scarring effect," can have enduring impacts on an individual's career prospects, lifetime earnings, and social mobility (ILO, 2020). Scarring refers to the phenomenon where prolonged periods of unemployment during youth lead to long-term disadvantages in the labour market, such as lower wages, reduced employability, and diminished career progression opportunities (Bell & Blanchflower, 2011).

Problem Statement

Despite the critical importance of addressing youth unemployment, the specific socio-economic impacts in Nepal remain underexplored, particularly in the context of the post-pandemic economic recovery. The youth unemployment rate in Nepal was estimated at 20.36% in 2023, significantly higher than the national average of 12.6%, highlighting deep-rooted structural challenges in the country's labour market (Central Bureau of Statistics, 2023). These challenges are compounded by inadequate education and skills development, limited access to finance, and the predominance of informal employment, which collectively hinder the ability of young people to secure stable and meaningful employment (Karki & Singh, 2020; Adhikari, 2021).

Research Objectives and Questions

This study seeks to critically examine how youth unemployment influences broader economic outcomes in Nepal, including GDP growth, poverty reduction, and social stability. The key research questions guiding this study are:

Q1. *What are the primary factors contributing to youth unemployment in Nepal?*

Q2. *How does youth unemployment impact Nepal's economic growth and social stability?*

Q3. *What policy measures can effectively reduce youth unemployment and promote economic development in Nepal?*

Significance and Theoretical Foundations of the Study

Addressing youth unemployment in Nepal is essential not only for economic growth but also for social stability and long-term development. High youth unemployment threatens to perpetuate cycles of poverty, reduce social mobility, and increase the potential for social unrest. Given the significant gap in the literature regarding the nuanced relationship between youth unemployment and economic development in Nepal, this study aims to provide crucial insights that can inform more effective policy interventions (Gurung & Sharma, 2021; Thapa, 2022).

The theoretical foundation of this study is grounded in human capital theory, which posits that the skills, knowledge, and abilities of individuals are critical drivers of economic growth (Becker, 1964). Human capital theory suggests that investments in education and skill development enhance labour productivity, thereby contributing to economic growth (Schultz, 1961). In the context of Nepal, the high rate of youth unemployment represents a significant underutilization of human capital. Sharma and Pant (2020) argue that when young people are unable to find employment that matches their skills, it results in a loss of potential productivity and innovation, which are essential for driving economic growth.

Furthermore, the scarring effect of youth unemployment exacerbates these challenges by creating long-term disadvantages for young workers. Studies have shown that prolonged unemployment during youth leads to lower lifetime earnings, reduced employability, and hindered career advancement, which in turn can perpetuate cycles of poverty and social inequality (Bell & Blanchflower, 2011). This study applies human capital theory and the concept of scarring to explore the socio-economic dynamics of youth unemployment in Nepal, offering new perspectives on how these factors influence the country's economic trajectory (Poudel & Gurung, 2021).

Scope of the study

This study focuses on the youth unemployment issue in Nepal, particularly in the context of post-pandemic economic recovery. The study analyses the relationship between youth unemployment and economic indicators such as GDP growth, poverty levels, and social stability. The study does not extend to other demographic groups or regions outside Nepal, ensuring a concentrated analysis of the specific challenges faced by the country's youth.

Literature Review

The literature review aims to critically evaluate the existing research on youth unemployment and its impact on economic development, both globally and in the context of Nepal. This review synthesizes key themes and trends in

the literature, identifies significant gaps, and establishes the theoretical framework that underpins the research. The review begins by discussing global trends in youth unemployment, highlighting the economic implications of high youth unemployment rates, particularly in developing countries. It then focuses on Nepal, examining the specific causes, impacts, and socio-economic factors contributing to youth unemployment. The review further explores the relationship between youth unemployment and broader economic indicators such as GDP growth, poverty levels, and social stability in Nepal. Lastly, it identifies gaps in the existing literature, particularly concerning the post-pandemic context, and outlines how this study aims to address these gaps, thereby contributing to the academic discourse.

Global Perspectives on Youth Unemployment

Youth unemployment is a global challenge with profound implications for economic growth and social stability. According to the International Labour Organization (ILO, 2022), youth unemployment rates consistently surpass those of adults, reflecting systemic barriers such as skills mismatches, economic volatility, and insufficient job creation in many regions. The economic implications of youth unemployment are significant, as it leads to reduced consumer spending, lower tax revenues, and increased welfare costs (World Bank, 2021). In developing countries, the situation is exacerbated by limited industrial diversification and weak labour market institutions, which contribute to a persistent cycle of poverty and economic underdevelopment (ILO, 2020). The long-term effects, often referred to as "scarring," result in lower lifetime earnings and decreased economic mobility for the affected individuals (ILO, 2020).

Youth Unemployment in Nepal

In Nepal, youth unemployment is a pressing issue that reflects broader structural challenges within the economy. The youth unemployment rate in Nepal, recorded at 20.36% in 2023, is significantly higher than the national average of 12.6%, indicating substantial difficulties for young people entering the labour market (Central Bureau of Statistics, 2023). The causes of youth unemployment in Nepal are multifaceted, including a mismatch between the skills provided by the education system and the demands of the labour market. Research by Karki and Singh (2020) demonstrates that many young graduates in Nepal are inadequately prepared for the job market, leading to high levels of underemployment and joblessness. Additionally, the high degree of informality in the labour market, where approximately 92% of employed youth are engaged, exacerbates the problem by offering low wages, job insecurity, and limited opportunities for career advancement (Adhikari, 2021).
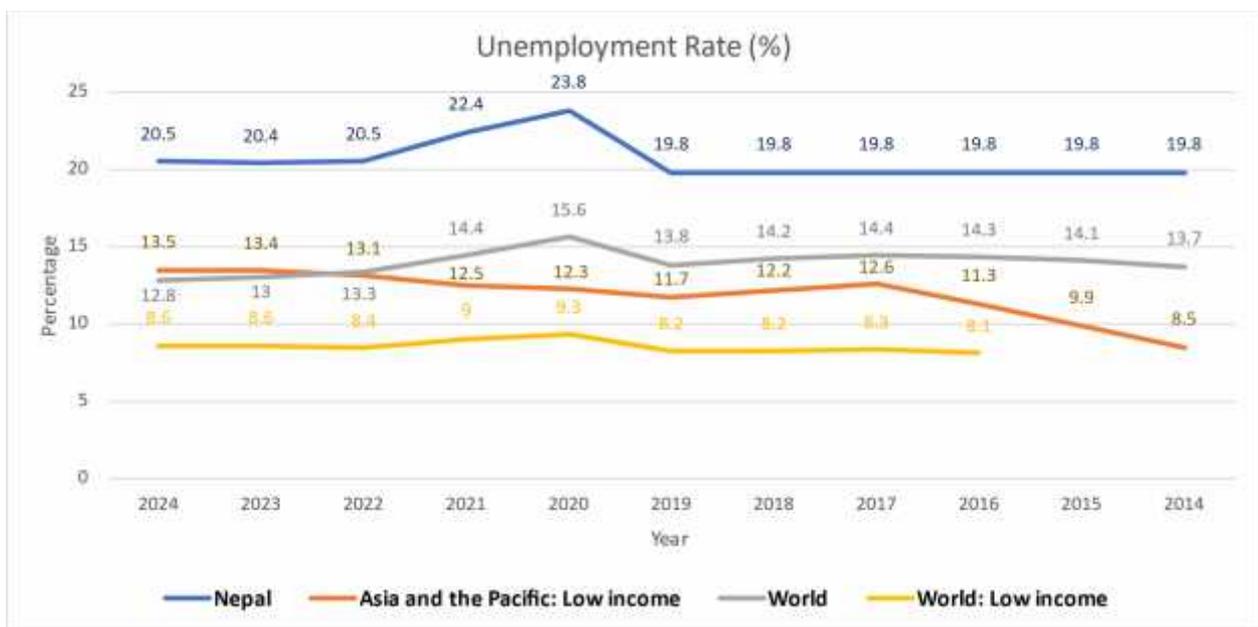
Figure 1: Comparing Youth Unemployment rates (15-24) of Nepal [ILO, 2024]

The COVID-19 pandemic has further aggravated the challenges faced by Nepal's youth. According to Gurung and Sharma (2021), the pandemic caused widespread job losses in sectors such as tourism, hospitality, and retail, which are major employers of young people. The study highlights that these job losses have deepened the vulnerabilities of young workers, many of whom were already in precarious employment before the pandemic. Moreover, the pandemic has underscored the fragility of youth employment in Nepal, where economic shocks can lead to significant increases in unemployment and underemployment.

Legal Provisions pertaining to Youth unemployment in Nepal

Nepal has implemented various labour and employment policies aimed at addressing the rights and welfare of workers, particularly in the context of rising youth unemployment. These policies include the Labour Act (2074), Foreign Employment Policy (2068), National Employment Policy (2071), and Social Security regulations, among others. Each policy plays a critical role in shaping the employment landscape and addressing the challenges faced by the youth in the labour market.

Constitution of Nepal (2072)

The Constitution of Nepal provides strong protections for young workers through several key provisions. Under *Fundamental Rights*, *Article 18(4)* ensures no gender discrimination in terms of remuneration and social security for equal work, guaranteeing that young men and women receive equal treatment in the workplace. Additionally, *Article 34(2)* grants all workers, including youth, the right to fair wages, benefits, and social security, thereby securing their economic and social well-being. *Article 43(1)* further extends social security rights to vulnerable groups, such as the poor, disabled, and those from disadvantaged social groups, which includes young workers needing additional support.

In the *Directive Principles and Policies of the State*, *Article 51(2)* emphasizes the state's commitment to providing social security for all workers based on the concept of decent work, ensuring that young workers are afforded their basic rights. Furthermore, *Annexure 9* highlights *social security and poverty alleviation* as shared responsibilities of the federal, provincial, and local governments, reinforcing a coordinated effort to provide protection and support programs for young workers across all levels of governance. These provisions collectively ensure fair treatment, equal opportunities, and social security for young workers in Nepal.

Labour Act (2074)

The Labour Act, 2074 specifically targets youth employment by defining youth as individuals aged 15 to 24 *(Section 2)* and guaranteeing their rights to fair wages and safe working conditions *(Section 3)*. The Act mandates social security benefits for all workers *(Section 5)* and includes provisions for skill development and the establishment of youth employment promotion centers *(Section 14)*. These measures aim to create secure and appealing job environments for young workers while addressing the need for relevant skills in the labour market.

Social Security Act (2074)

The Social Security Act enhances job security for young workers by outlining various benefits such as health insurance and pensions *(Section 6)*. It mandates employer registration with the Social Security Fund (SSF) to promote formal employment *(Section 2.2)* and extends coverage to informal sector workers *(Section 5)*. By targeting vulnerable groups, this Act plays a crucial role in providing necessary protections and opportunities for youth in the labour market.

National Employment Policy (2068)

The National Employment Policy prioritizes youth employment by promoting domestic job creation and coordinating with various agencies *(Section 14.1)*. It includes provisions for action plans to boost youth employment *(Section 14.2)* and supports women entrepreneurship *(Section 14.3)*. Additionally, it emphasizes training programs for youth with limited education *(Section 14.6)*, thereby fostering skill development and enhancing access to job opportunities, particularly for marginalized groups.

Labour and Employment Policy (2062)

The Labour and Employment Policy 2062 addresses key challenges faced by youth in Nepal, particularly unemployment and skills mismatches. It encourages youth participation in micro-credit programs *(3.1.10)* to facilitate self-employment and emphasizes quality vocational training *(Objective 3.4)*. The policy also provides targeted support for educated unemployed youth and dropouts *(3.4.6)* and prioritizes marginalized groups *(3.4.13)*. This comprehensive approach aims to empower young individuals and promote entrepreneurial initiatives.

Foreign Employment Policy (2068)

While the Foreign Employment Policy 2068 establishes frameworks for safeguarding youth seeking employment abroad, it falls short in addressing the underlying issues of domestic employment. It emphasizes skill-based training and collaboration with technical institutions *(Sections 9.2 and 9.4)* but lacks a robust focus on creating local job

opportunities. Encouraging remittance reinvestment into local sectors *(Section 9.7)* is beneficial, yet a stronger emphasis on fostering domestic industries and entrepreneurship is needed to reduce reliance on foreign employment.

Table 1: Legal Provisions for youth employment in Nepal

Policy/Act	Key Provisions	Focus Areas
Nepal Constitution (2072)	**Article 18(4)**: No gender discrimination in remuneration and social security. **Article 34(2)**: Right to fair wages, benefits, and social security for all workers. **Article 43(1)**: Social security for vulnerable groups, including young workers. **Article 51(2)**: Commitment to social security based on decent work.	Fair treatment, equal opportunities, and social security for young workers.
Labour Act (2074)	**Section 2**: Defines youth (15-24 years). **Section 3**: Guarantees fair wages, safe conditions, and protection from exploitation. **Section 5**: Social security benefits for all workers. **Section 14**: Various provisions for skill development, youth employment promotion centers, and entrepreneurship.	Youth employment, skill development, social protection, and promoting entrepreneurship.
Social Security Act (2074)	**Section 6**: Outlines benefits like health insurance and pensions. **Section 2.2**: Employers must register employees with the Social Security Fund (SSF). **Section 5**: Extends coverage to informal sector workers.	Job security, formal employment, support for skill development, and targeting vulnerable groups.
National Employment Policy (2068)	**Section 14.1**: Encourages domestic employment coordination. **Section 14.2**: Action plan for youth employment. **Section 14.3**: Promotes women entrepreneurship. **Section 14.6**: Training programs for low-educated youth.	Domestic employment, entrepreneurship, skill development, and supporting vulnerable groups.
Labour and Employment Policy (2062)	**3.1.10**: Encourages youth participation in micro-credit programs. **Objective 3.4**: Emphasizes quality vocational training. **3.4.6**: Targets support for educated unemployed youth and dropouts. **3.4.13**: Focus on marginalized youth.	Financial resources for self-employment, skill alignment with market needs, and support for marginalized groups.
Foreign Employment Policy (2068)	▪ Emphasizes skill-based training for youth. ▪ Focuses on collaboration with technical institutions (CTEVT). ▪ Highlights need for improved access to skill training for marginalized groups. ▪ Encourages reinvestment of remittances into local sectors.	Foreign employment safeguards, skill development, but lacks focus on domestic employment opportunities.

Theoretical Foundation

The theoretical foundation of this study is grounded in human capital theory, which posits that the skills, knowledge, and abilities of individuals are critical drivers of economic growth (Becker, 1964). In Nepal, the high rate of youth unemployment represents a significant underutilization of human capital, with far-reaching implications for the country's economic development. Sharma and Pant (2020) argue that the inability of young people to find employment that matches their skills results in a loss of potential productivity and innovation, which are essential for driving economic growth. Human capital theory suggests that investments in education and training are crucial for improving labour market outcomes. However, in Nepal, the disconnect between educational outcomes and labour market needs has led to a situation where many young people, despite being educated, remain unemployed or underemployed (Dhakal, 2021). This study applies human capital theory to explore the dynamics of youth

unemployment in Nepal, focusing on how these challenges impact economic development and identifying strategies to enhance the employability of young people.

Gap of the Study

Despite the extensive research on youth unemployment globally, specific studies focusing on the socio-economic impacts of youth unemployment in Nepal are limited. Existing literature often emphasizes the macroeconomic aspects of unemployment, with insufficient attention given to the microeconomic effects on youth and the long-term consequences for economic development (Gurung & Sharma, 2021). Additionally, there is a lack of research on the impact of recent policy and legal framework impact on youth unemployment in Nepal (Adhikari, 2021). Furthermore, while several studies have examined the relationship between education and employment in Nepal, there is a need for more comprehensive research that integrates these findings with broader economic trends. Dhungana (2018) highlights the insufficient exploration of how the skills mismatch affects long-term economic outcomes, particularly in the context of Nepal's evolving economic landscape. This study seeks to address these gaps by providing a detailed analysis of the current state of youth unemployment in Nepal, its impacts on economic development, and the effectiveness of existing policy responses. By integrating empirical data with theoretical insights, this research aims to contribute to the development of more effective strategies for reducing youth unemployment and fostering sustainable economic growth in Nepal.

Research Methodology

The study involved 100 participants from the Kathmandu Valley, selected through purposive sampling to ensure a diverse representation across various demographics and sectors (Merriam & Tisdell, 2016). The Kathmandu Valley was selected as the research site because it serves as the economic and political hub of Nepal. This area attracts youth from across the country who are seeking better educational and employment opportunities, making it an ideal context for examining the multifaceted issue of youth unemployment (Thapa & Mainali, 2020). The valley's diverse population, encompassing different ethnicities, educational backgrounds, and socio-economic statuses, offered a broad spectrum of perspectives essential for a comprehensive understanding of the issue. Furthermore, given that many employment and education policies are first implemented in the Kathmandu Valley, this location provided a strategic vantage point to study the practical implications of these policies on youth employment (Gautam, 2021).

Data Collection

The participant pool consisted of 40 unemployed youth, 20 employers and industry experts, 15 educators and academic administrators, 15 government officials and policymakers, and 10 NGO representatives and social activists. This diverse group was chosen to capture a wide range of perspectives on the causes, challenges, and potential solutions to youth unemployment (Silverman, 2020). The unemployed youth, aged 18 to 30, provided firsthand accounts of the barriers they faced in securing employment. Employers and industry experts contributed insights into the demand side of the labour market, particularly the skills gap and hiring practices. Educators and academic administrators shared their perspectives on the alignment between education and employment, often highlighting the educational mismatch that leads to unemployment (Brown & Hesketh, 2004). Policymakers provided crucial insights into the effectiveness of current policies and potential reforms, while NGO representatives and social activists shared practical knowledge of the socio-economic challenges faced by youth and the effectiveness of interventions aimed at reducing unemployment (Karki & Poudel, 2019).

Data collection methods included semi-structured interviews, focus groups, and document analysis. Semi-structured interviews were conducted with individuals from each participant group, allowing for detailed exploration of their experiences, views, and suggestions regarding youth unemployment (Kvale & Brinkmann, 2009). Focus groups, consisting of 6-8 participants each, facilitated rich discussions on key themes such as job market challenges, the role of education, and potential solutions like skill development and entrepreneurship. Document analysis of relevant government policies, educational curricula, and NGO reports provided additional context and helped identify gaps in current practices (Bowen, 2009).

Data Analysis Methods

Thematic analysis was employed to analyze the qualitative data, with the coding process identifying recurring themes such as "economic barriers," "educational mismatch," and "entrepreneurship opportunities" (Braun & Clarke, 2006). This method facilitated the construction of a comprehensive narrative that integrated the diverse perspectives of the participant groups, providing a holistic understanding of the issue.

Ethical considerations were paramount throughout the study. Participants were fully informed about the research's purpose, their role, and their rights, including the right to withdraw at any time. Written consent was obtained, and confidentiality was maintained by anonymizing personal information and using pseudonyms (Cohen, Manion, & Morrison, 2018). The research was conducted with strict neutrality to ensure unbiased results.

Although the study focused on the Kathmandu Valley, which may limit the generalizability of the findings to other regions of Nepal, it provided valuable insights into the factors contributing to youth unemployment and its impact on economic development. The qualitative approach and diverse participant pool ensured a rich and nuanced understanding of the issue, making the findings relevant for informing policy and practice in addressing youth unemployment in Nepal (Miles, Huberman, & Saldaña, 2014).

Findings

Causes of Youth Unemployment in Nepal

The qualitative research conducted in December 2023 provided critical insights into the multifaceted causes of youth unemployment in Nepal, with a focus on the Kathmandu Valley. The findings are organized into four main categories: economic factors, educational mismatch, social and cultural factors, and policy and institutional factors. Each category reveals unique challenges that contribute to the persistent issue of youth unemployment, requiring targeted and multifaceted interventions.

Economic Factors

Limited Job Creation: The research identified a significant limitation in job creation within key economic sectors such as manufacturing, agriculture, and services. Employers and industry experts emphasized that these sectors have not expanded at a pace sufficient to accommodate the increasing number of young job seekers. Despite being well-qualified, many young people find themselves unable to secure employment due to the stagnant growth of these industries. The underlying reasons include a lack of industrial growth and insufficient investment in sectors that traditionally absorb large numbers of workers, particularly young people. The absence of a robust industrial base has also hindered the diversification of job opportunities, exacerbating unemployment among the youth.

Economic Slowdown: The study also highlighted the impact of economic slowdowns, driven by both internal and external factors, on job creation. Government officials and policymakers pointed out that periods of low GDP growth, often resulting from political instability within the country and unfavourable global economic conditions, have led to reduced business investments. This downturn has had a particularly adverse effect on small and medium-sized enterprises (SMEs), which are typically significant employers of young workers. The reduced investment and subsequent decline in SME growth have further compounded the unemployment crisis, as these enterprises struggle to maintain or increase their workforce.

Educational Mismatch

Skills Gap: A critical finding of the research was the mismatch between the skills provided by educational institutions and those demanded by the labour market. Both educators and employers acknowledged that the current education system in Nepal heavily emphasizes theoretical knowledge while often neglecting the practical skills required in industries such as information technology, engineering, and healthcare. As a result, many graduates enter the job market underprepared, leading to high unemployment rates even among those with advanced degrees. The lack of practical training and industry-relevant skills creates a significant barrier to employment, leaving many young people unable to meet the specific needs of employers.

Outdated Curriculum: The research also revealed that the curricula in many educational institutions are outdated and not aligned with the current demands of the industry. Educators admitted that the content being taught often fails to keep pace with rapid technological advancements and the evolving needs of the job market. This misalignment between education and industry requirements results in graduates lacking the up-to-date skills and knowledge that employers seek, further contributing to the problem of youth unemployment. The outdated curricula also mean that students are not exposed to the latest trends and technologies, leaving them at a disadvantage when competing for jobs in a globalized market.

Social and Cultural Factors

Preference for White-Collar Jobs: The research underscored a strong societal preference for white-collar jobs, which significantly contributes to youth unemployment. Discussions with unemployed youth revealed a cultural

stigma associated with blue-collar work, which is often viewed as less prestigious. This societal attitude discourages young people from pursuing opportunities in sectors like agriculture, manufacturing, and vocational trades, where there is a demand for workers. As a result, many young people remain unemployed while job vacancies in these sectors go unfilled. The preference for white-collar jobs is also fuelled by societal expectations and family pressures, which steer young people away from vocational training and into academic paths that may not lead to immediate employment.

Gender Disparities: The research found that gender disparities have a substantial impact on youth employment, particularly for young women. Traditional gender roles and societal expectations often limit the career choices available to women, steering them towards saturated sectors such as teaching, nursing, and clerical work. These sectors, while traditionally female-dominated, are also among the most competitive and offer fewer opportunities for career advancement. Additionally, biases in hiring practices and a lack of supportive workplace policies further hinder young women's access to employment. As a result, female youth in Nepal face higher unemployment rates compared to their male counterparts, with many women unable to break into non-traditional sectors due to societal and institutional barriers.

Policy and Institutional Factors

Weak Labour Market Policies: The effectiveness of current labour market policies was a significant concern identified in the study. Policymakers admitted that many of the policies aimed at reducing youth unemployment are either inadequately implemented or lack a specific focus on the youth demographic. There are few incentives for companies to hire young workers, and existing policies often do not address the unique challenges faced by the youth labour market. This has led to a limited impact in reducing unemployment rates among young people. Furthermore, the lack of targeted interventions means that many young people remain unemployed or underemployed, with little hope of finding sustainable employment in the near future.

Lack of Support for Startups: The research also highlighted the lack of institutional support for young entrepreneurs in Nepal. Participants, particularly aspiring entrepreneurs and NGO representatives, pointed out that young people face numerous challenges in accessing finance, mentorship, and market opportunities. The financial system's risk-averse nature, combined with the absence of robust business incubation programs and the presence of bureaucratic obstacles, discourages entrepreneurship as a viable career path for youth. Without adequate support, many young people are unable to turn their entrepreneurial ideas into successful businesses, contributing to the overall unemployment problem. The lack of support for startups also means that potential job creators are left without the necessary resources to thrive, further limiting employment opportunities for the youth.

The findings of this research illustrate that youth unemployment in Nepal is driven by a complex interplay of economic, educational, social, cultural, and institutional factors. Addressing this issue requires targeted interventions across these areas, including expanding job creation in key sectors, aligning educational curricula with market needs, challenging societal norms, and developing more effective labour market policies and support systems for young entrepreneurs. A holistic approach that considers the interconnected nature of these factors is essential for creating sustainable employment opportunities for Nepal's youth.

Impact of Youth Unemployment on Economic Development in Nepal

The qualitative research conducted in December 2023 provided critical insights into the multifaceted impact of youth unemployment on economic development in Nepal, with a focus on the Kathmandu Valley. The findings are categorized into three main areas: economic costs, social costs, and long-term economic implications. These areas highlight the interconnected and far-reaching consequences of youth unemployment, underscoring the need for comprehensive strategies to address this challenge.

Economic Costs

Lost Productivity: The research identified lost productivity as one of the most immediate and measurable economic costs of youth unemployment. A significant portion of Nepal's youth, representing the most dynamic segment of the labour force, remains underutilized. Employers and policymakers highlighted that this underutilization results in a substantial loss of potential economic output, as these young people are not contributing to the productive activities that drive economic growth. The lack of engagement in the workforce by a large segment of the population directly reduces the country's Gross Domestic Product (GDP). This loss is particularly detrimental in key sectors such as manufacturing, agriculture, and services, which are critical for the country's overall economic development. The

economic output that could be generated by a fully employed youth population remains untapped, representing a significant opportunity cost for the nation.

Increased Dependency: Youth unemployment also leads to increased financial dependency on families and government support systems. The research revealed that many unemployed youths, particularly those who have migrated from rural areas to urban centers like the Kathmandu Valley in search of better opportunities, rely heavily on their families for financial support. This dependency reduces household savings and disposable income, which in turn dampens overall economic consumption. The ripple effect is a slowdown in consumer spending, which is a key driver of economic growth. Moreover, the government's fiscal resources, which could be invested in infrastructure, education, or other development projects, are instead diverted to unemployment benefits and social welfare programs. This reallocation of resources strains the economy and limits the government's ability to invest in initiatives that could spur economic development and create new job opportunities.

Social Costs

Rising Crime Rates: The study found a troubling correlation between youth unemployment and rising crime rates. Prolonged unemployment often leads to frustration, disillusionment, and a sense of hopelessness among young people. Policymakers and representatives from non-governmental organizations (NGOs) noted that these negative emotions can push some unemployed youth towards criminal activities as a means of economic survival. This shift not only destabilizes communities but also imposes significant costs on law enforcement and the criminal justice system. The societal impact of increased crime rates includes a pervasive sense of insecurity, which can deter both domestic and foreign investment. Investors are often reluctant to commit resources to areas with high crime rates, further hindering economic development. The cycle of unemployment leading to crime, which in turn discourages investment, creates a reinforcing loop that exacerbates economic challenges.

Mental Health Issues: Another critical social cost identified is the impact of youth unemployment on mental health. The research highlighted that many unemployed youths experience high levels of stress, anxiety, and depression due to their inability to find stable employment. These mental health issues not only affect the individual's well-being but also have broader societal implications. The decline in mental health can reduce overall productivity, as individuals struggling with psychological issues are less likely to engage effectively in job search activities or, if employed, perform optimally in the workplace. The psychological impact of prolonged unemployment often diminishes motivation and confidence, creating a vicious cycle where affected individuals find it increasingly difficult to re-enter the job market. This deterioration in mental health can also lead to increased healthcare costs and reduced societal cohesion, further straining the economy.

Long-Term Economic Implications

Skills Erosion: The research revealed that prolonged unemployment among youth leads to significant skills erosion, which has serious long-term economic implications. Employers and industry experts pointed out that when young people remain unemployed for extended periods, they are likely to lose the skills and knowledge they acquired during their education or previous employment. This skills erosion not only diminishes the individual's employability over time but also reduces the overall skill level of the workforce, which is critical for driving innovation and productivity growth. In a rapidly changing global economy, where technological advancements and new industries require continuous skill development, the erosion of skills among the youth population poses a serious threat to Nepal's ability to compete internationally. The reduction in the availability of a skilled workforce limits the country's capacity to attract high-quality investments and hampers the potential for economic diversification and growth.

Delayed Economic Independence: Youth unemployment was also found to significantly delay economic independence among young people, which has broader implications for economic growth. Unemployed youth reported facing difficulties in achieving financial independence, which in turn delays major life decisions such as marriage, homeownership, and investment in further education or entrepreneurship. These delays slow down the broader economic cycle, as young people who are not financially independent are less likely to contribute to key economic activities such as consumer spending and homeownership. These economic activities are crucial for driving demand in various sectors, including construction, real estate, and retail. Moreover, policymakers noted that the delayed economic independence of the youth population affects the country's demographic dividend—the potential economic benefits arising from a large working-age population—by preventing this age group from fully participating in and contributing to economic development. This delay not only slows down current economic growth but also has long-term implications for the country's economic trajectory.

Role of Education in Addressing Youth Unemployment in Nepal

The qualitative research conducted in December 2023 provides crucial insights into the role of education in addressing youth unemployment in Nepal, particularly within the Kathmandu Valley. The findings reveal that while education is a critical factor in improving employability and reducing unemployment, there are significant gaps and challenges within the current educational system that need to be addressed. These challenges are categorized into three key areas: curriculum alignment with market needs, the importance of vocational training, and the role of STEM education and soft skills development.

Curriculum Alignment with Market Needs

Mismatch between Education and Employment: One of the primary findings of the research is the significant misalignment between the education system and the needs of the job market. Both educators and employers expressed concern that the curricula in many educational institutions are outdated and fail to equip students with the practical skills required in today's workforce. Employers, particularly in sectors such as technology, engineering, and healthcare, reported that graduates often lack the hands-on experience and industry-specific knowledge necessary for immediate employment. This disconnects between education and employment has resulted in high unemployment rates among youth, as many find themselves underqualified for available jobs despite holding formal degrees.

Need for Curriculum Reform: The research participants, particularly those from the educational sector, strongly advocated for urgent curriculum reform to bridge the gap between education and employment. There was a consensus that curricula need to be updated to include more practical, hands-on training alongside traditional theoretical instruction. This would involve not only modernizing the content to keep pace with technological advancements but also ensuring that the skills being taught are directly relevant to the demands of the job market.

Importance of Vocational Training

Lack of Vocational Education Opportunities: The study highlighted a severe lack of vocational education and training (VET) opportunities in Nepal, particularly in urban areas like the Kathmandu Valley. The current educational system is heavily skewed towards academic, theory-based education, with insufficient emphasis on vocational skills. This imbalance leaves many young people without the specific skills needed for technical and trade jobs, which are often more accessible and in demand than white-collar positions.

Potential of Vocational Training: The research underscored the potential of vocational training as a key strategy for addressing youth unemployment. Employers and policymakers agreed that expanding vocational education could play a critical role in bridging the skills gap and reducing unemployment. Vocational training programs can provide young people with the practical skills required for various trades and technical jobs, which are often less saturated than academic fields.

Role of STEM Education and Soft Skills Development

Promotion of STEM Education: The research findings indicate that STEM (Science, Technology, Engineering, and Mathematics) education is underemphasized in Nepal's current educational framework. Despite the growing importance of STEM-related industries in the global economy, there is a lack of focus on these subjects within Nepalese schools and universities.

Importance of Soft Skills: In addition to technical skills, the research highlighted the critical role of soft skills in improving employability. Both employers and educators pointed out that many young job seekers lack essential soft skills such as critical thinking, communication, teamwork, and leadership. These skills are increasingly valued in the modern workplace, where collaboration, adaptability, and problem-solving are key to success.

Overall Findings and Participants' Suggestions

Key findings from the qualitative study indicate that economic constraints, such as limited job creation and economic slowdowns, significantly hinder employment opportunities for young people. The educational system's misalignment with market needs, characterized by outdated curricula and a lack of vocational training, exacerbates the skills gap, leaving graduates unprepared for available jobs. Social and cultural factors, including a preference for white-collar jobs and gender disparities, further complicate the employment landscape. Additionally, ineffective labour market policies and insufficient institutional support for young entrepreneurs contribute to the crisis. The repercussions of youth unemployment extend beyond individual hardships, impacting economic development through lost productivity, increased dependency, rising crime rates, and long-term implications like skills erosion and delayed

economic independence. Addressing these multifaceted challenges requires following actions as per participants' suggestions.

Youth Demand for Vocational Training: Many unemployed youths expressed a desire for more vocational training options that would equip them with marketable skills. They acknowledged that while academic education is important, vocational training offers a more direct path to employment, especially in technical fields where practical skills are crucial.

Promoting Entrepreneurship: Vocational training not only prepares youth for employment but also fosters entrepreneurship by equipping them with the practical knowledge needed to start and manage their own businesses. This dual benefit—enhancing employability and promoting self-employment—could contribute significantly to job creation and economic development in Nepal.

Global and Local Relevance: Participants noted that enhancing the focus on STEM education could provide young people with the skills needed to succeed in industries that are driving economic growth both globally and locally. STEM fields are particularly important in addressing the technological and industrial challenges facing Nepal, and a stronger emphasis on these subjects could help reduce youth unemployment by preparing graduates for high-demand jobs in these areas.

Early Exposure and Specialized Programs: The research suggested that early exposure to STEM subjects, starting at the primary education level, is crucial for fostering interest and competence in these fields. Additionally, developing specialized programs at the secondary and tertiary levels that encourage more students to pursue careers in STEM would be beneficial in creating a workforce equipped for the challenges of the 21st century.

Integration into Curriculum: The findings suggest that integrating soft skills development into the educational curriculum, alongside technical and vocational training, would greatly enhance the readiness of graduates to enter the workforce. Programs that emphasize these skills can help students develop the ability to work effectively in teams, communicate clearly, and lead initiatives—all of which are crucial for career success in today's job market.

Employer Expectations: Employers are looking for candidates who not only have the technical knowledge required for a job but also the interpersonal and cognitive skills necessary to thrive in a collaborative environment. By focusing on soft skills development, educational institutions can better prepare students to meet these expectations, thereby improving their chances of securing employment.

Industry Involvement in Curriculum Development: One of the key suggestions was to involve industry professionals in the curriculum development process. By incorporating insights from those actively engaged in the workforce, educational programs can be tailored to meet current and future industry needs, thereby enhancing the employability of graduates. This approach would ensure that students acquire the skills and knowledge necessary to succeed in the competitive job market.

Impact on Unemployment: The mismatch between what is taught in schools and what is required in the job market leads to a situation where young graduates are unable to meet the expectations of employers. This educational gap forces many to remain unemployed or underemployed, further exacerbating the youth unemployment crisis in Nepal.

Discussion

The study explores the complex issue of youth unemployment and its impact on economic development, highlighting several factors, including educational mismatches, economic barriers, and cultural dynamics. The findings from the article present several points of convergence and divergence from the theoretical viewpoints that are systematically discussed below:

Global and Local Trends in Youth Unemployment

Youth unemployment is a significant global issue with profound economic and social consequences. According to the International Labour Organization (2022), youth unemployment rates consistently exceed adult unemployment rates, leading to long-term challenges like reduced consumer spending, lower tax revenues, and increased welfare costs. These problems are particularly severe in developing countries, where weak labour market institutions and limited industrial diversification compound the issue (ILO, 2022). The findings from the study reflect these global trends but focus on Nepal's specific situation. Nepal's youth unemployment rate stood at 20.36% in 2023, much higher than the national average of 12.6%, underscoring the structural issues within the country's labour market (Central Bureau of

Statistics, 2023). Additionally, the findings highlight how the COVID-19 pandemic worsened these challenges, especially in industries like tourism and retail, which are key employers for young people (Gurung & Sharma, 2021).

Educational Mismatch and Curriculum Gaps

Both the literature and the findings emphasize the role of education in contributing to youth unemployment. The literature points to a critical mismatch between the skills young people gain in school and those required by the job market. Karki and Singh (2020) argue that Nepal's education system places too much focus on theoretical knowledge, leading to high levels of underemployment and unemployment. The study's findings echo this, showing that many graduates enter the job market without the practical skills needed in fields like IT, healthcare, and engineering. Employers and educators interviewed in the research raised concerns about outdated curricula in schools and universities (Adhikari, 2021). This mismatch between education and market needs leaves many young people unemployed despite having formal qualifications, highlighting the need for urgent curriculum reform to close the skills gap (Dhakal, 2021).

Socio-Economic and Cultural Barriers

The literature also addresses the socio-economic and cultural barriers that prevent young people from finding employment, especially in developing countries like Nepal. Bell and Blanchflower (2011) discuss the "scarring effect" that results from prolonged youth unemployment, where young people who can't find work face long-term consequences like lower wages and reduced employability. The study's findings support this, showing that many young Nepalese, particularly those who migrate to urban areas like Kathmandu, become financially dependent on their families due to a lack of job opportunities (ILO, 2020). Cultural factors further complicate the situation. For example, there is a strong societal preference for white-collar jobs, which discourages young people from pursuing vocational trades, even though these fields often have more job opportunities (Adhikari, 2021).

Economic and Policy Implications

The literature also highlights the importance of labour laws and employment policies in addressing youth unemployment. Nepal's labour laws, such as the Labour Act (2074) and the National Employment Policy (2068), provide frameworks for skills development and job creation, but they have not effectively addressed the underlying structural challenges in the labour market (Central Bureau of Statistics, 2023). The study's findings align with this, revealing that current labour market policies have had limited impact, with issues like insufficient support for startups and weak incentives for hiring young workers persisting (Sharma & Pant, 2020). Additionally, the lack of institutional support for entrepreneurship discourages young people from starting their own businesses, perpetuating high unemployment rates (Adhikari, 2021).

Conclusion and Future Implications

Youth unemployment in Nepal is a multifaceted issue deeply intertwined with global trends, educational shortcomings, socio-economic barriers, and ineffective policy responses. The study highlights the critical mismatch between the skills taught in educational institutions and the demands of the labour market, exacerbated by outdated curricula and limited vocational training opportunities. Socio-cultural factors, such as a preference for white-collar jobs, further aggravate the problem, while weak labour policies and inadequate institutional support for entrepreneurship hinder potential solutions. As Nepal faces the additional challenges brought on by the COVID-19 pandemic, addressing youth unemployment requires a holistic approach that includes educational reforms, policy improvements, and targeted support for young entrepreneurs. Bridging these gaps is essential for creating sustainable employment opportunities and ensuring the country's economic development.

Both the literature and the study's findings point to significant gaps in research on youth unemployment in Nepal. While global studies provide ample data, there is limited research focusing on the specific economic impacts in Nepal, particularly after the pandemic. The study emphasizes the need for more research into the effectiveness of Nepal's policy interventions and their impact on youth employment, especially in the context of post-pandemic recovery. Furthermore, there is a lack of comprehensive studies connecting the skills mismatch in education to broader economic trends—a gap that this study seeks to fill by combining empirical data with theoretical insights.

References

Adhikari, R. (2021). The impact of the COVID-19 pandemic on youth unemployment in Nepal. *Journal of Development Studies, 57*(4), 601-619. https://doi.org/10.1080/00220388.2021.1872792

Adu-Gyamfi, S. (2017). Vocational education and youth employment in Ghana: A pathway to employment and economic growth. *International Journal of Vocational and Technical Education, 9*(3), 23-32.

Becker, G. S. (1964). *Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education.* University of Chicago Press.

Bell, D. N. F., & Blanchflower, D. G. (2011). Young people and the Great Recession. *Oxford Review of Economic Policy, 27*(2), 241-267. https://doi.org/10.1093/oxrep/grr011

Bowen, G. A. (2009). Document analysis as a qualitative research method. *Qualitative Research Journal, 9*(2), 27-40.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology, 3*(2), 77-101.

Brown, P., & Hesketh, A. (2004). *The Mismanagement of Talent: Employability and Jobs in the Knowledge Economy.* Oxford University Press.

Central Bureau of Statistics. (2023). *National Labour Force Survey 2023.* Government of Nepal.

Chew, E. (2018). The role of STEM education in economic growth: A case study of Malaysia. *Asian Education and Development Studies, 7*(3), 263-278.

Choudhury, A., & Das, S. (2019). Educational reform and youth unemployment in India. *Economic and Political Weekly, 54*(21), 33-40.

Cohen, L., Manion, L., & Morrison, K. (2018). *Research Methods in Education* (8th ed.). New York: Routledge.

Creswell, J. W., & Poth, C. N. (2017). *Qualitative Inquiry and Research Design: Choosing Among Five Approaches* (4th ed.). Sage.

Dhakal, R. (2021). Education and employment: Addressing the skills mismatch in Nepal. *Economic Journal of Nepal, 44*(2), 117-133. https://doi.org/10.3126/ejon.v44i2.36273

Dhungana, B. (2018). Informal employment and youth labour market outcomes in Nepal. *Nepal Economic Review, 45*(1), 85-102. https://doi.org/10.3126/ner.v45i1.31098

Gautam, B. (2021). Youth unemployment in Nepal: Challenges and prospects. Tribhuvan University Press.

Government of Nepal. (2006). *Labour and Employment Policy 2062*. Ministry of Labour and Transport Management.

Government of Nepal. (2011). *Foreign Employment Policy 2068*. Ministry of Labour and Employment.

Government of Nepal. (2011). *National Employment Policy 2068*. Ministry of Labour, Employment and Social Security.

Government of Nepal. (2015). *Constitution of Nepal (Nepal Constitution 2072)*. https://www.lawcommission.gov.np

Government of Nepal. (2017). *Labour Act 2074*. https://www.lawcommission.gov.np

Government of Nepal. (2017). *Social Security Act 2074*. https://www.lawcommission.gov.np

Gurung, B., & Sharma, P. (2021). Youth Employment and Post-Pandemic Economic Recovery in Nepal. Kathmandu: Social Science Baha.

Gurung, H., & Sharma, P. (2021). The role of informal employment in youth labour market outcomes in Nepal. *South Asia Economic Journal, 22*(2), 203-221. https://doi.org/10.1177/13915614211026442

International Labour Organization (ILO). (2020). *Global Employment Trends for Youth 2020: Technology and the Future of Jobs.* ILO.

International Labour Organization (ILO). (2022). *World Employment and Social Outlook: Trends 2022.* ILO.

Karki, B., & Poudel, R. (2019). Youth unemployment and policy responses in Nepal. *Economic Journal of Development Issues, 27*(1), 45-60.

Karki, M., & Singh, A. (2020). *Educational Mismatch and Unemployment in Nepal*. Kathmandu: National Education Commission.

Karki, S., & Singh, D. (2020). The challenge of youth unemployment in Nepal: An overview. *Nepalese Journal of Economics, 6*(1), 45-61. https://doi.org/10.3126/nje.v6i1.34061

Kvale, S., & Brinkmann, S. (2009). *Interviews: Learning the Craft of Qualitative Research Interviewing* (2nd ed.). Sage.

Lim, S. (2019). STEM education in Singapore: Strategies for success. *Journal of Educational Research and Practice, 9*(2), 156-171.

Merriam, S. B., & Tisdell, E. J. (2016). *Qualitative Research: A Guide to Design and Implementation* (4th ed.). Jossey-Bass.

Miles, M. B., Huberman, A. M., & Saldaña, J. (2014). *Qualitative Data Analysis: A Methods Sourcebook* (3rd ed.). Sage.

Owino, E., & Kinyanjui, P. (2018). The impact of vocational training on youth employment in Kenya. *Journal of African Development, 20*(1), 45-63.

Patton, M. Q. (2015). *Qualitative Research & Evaluation Methods* (4th ed.). Sage.

Poudel, B., & Gurung, S. (2021). The economic implications of youth migration in Nepal: A macroeconomic perspective. *Asian Development Review, 38*(1), 83-105. https://doi.org/10.1162/adev_a_00148

Schultz, T. W. (1961). Investment in human capital. *The American Economic Review, 51*(1), 1-17.

Sharma, K., & Pant, B. (2020). Human capital and economic development: The case of youth unemployment in Nepal. *Nepal Economic Forum, 12*(2), 27-39. https://doi.org/10.3126/nefj.v12i2.32853

Silverman, D. (2020). *Doing Qualitative Research* (5th ed.). Sage.

Thapa, M. (2022). Policy responses to youth unemployment in Nepal: An evaluation of effectiveness. *International Labour Review, 161*(3), 415-432. https://doi.org/10.1111/ilr.12345

Thapa, R. B., & Mainali, R. (2020). Socio-economic dynamics of youth migration in Kathmandu Valley. *Nepalese Journal of Development and Rural Studies, 17*(2), 95-108.

World Bank. (2021). *Youth Employment in Developing Economies: A Global Perspective.* World Bank Group.

Impact of Fiscal and Financial Dynamics on Shaping the Development in Nepal

Padma Kumar Adhikari, Ph.D.
Associate Professor
Ratna Rajyalaxmi Campus, TU.
Email: adhikaripadam26@gmail.com

Dil Nath Dangal, Ph.D.
Lecturer, Ratna Rajyalaxmi Campus, TU.
Email: dangaldilnath@gmail.com
https://orcid.org/0000-0003-1381-6239

Ram Prasad Gajurel
Lecturer, Mahendra Multiple Campus, TU.
Email: ram.gajurel@mahmc.tu.edu.np (*Corresponding author*)
https://orcid.org/0000-0001-5693-1953

Krishna Prasad Ghimire
Lecturer, Jumla Multiple Campus, TU.
Email: ksghimire@gmail.com

Abstract

This study attempts to explore the fiscal and financial dynamics of the economic development in Nepal. Employing robust ordinary least squares (OLS) with time series spanning from 1993 to 2022, this study examined the long-run impact of various fiscal and financial variables on Nepal's GDP. Before it, this study pretested cointegration between studied variables and failed to find any evidence of such a long relationship. Thus, the findings of OLS indicated that value-added tax (VAT) and investment significantly drive GDP growth, while income tax and remittances have no significant impact on GDP in Nepal. The study thus suggests that policymakers should focus on proper channelization of income tax and remittance inflows with VAT and investment for the economic development of Nepal.

Keywords: Taxation, Investment, Remittance, Nepalese economy, OLS

Introduction

The fiscal elements encompassing fiscal policies, such as taxation and government spending, along with financial elements such as investment and remittances, have been pivotal in shaping the economic landscape of developing nations (Keen & Mansour, 2018; Gajurel, et al., 2021; Pandey, et al. 2022; Adhikari, et al., 2023). These components have collectively influenced the allocation of resources, the distribution of wealth, and the overall economic productivity, which are essential for achieving sustainable growth. Taxation, particularly income tax and value-added tax (VAT) have served as a primary source of revenue for the government, enabling public investment in infrastructure, education, and social services (Keen & Mansour, 2018; Khadka, 2018; Keen & Mansour, 2018). Income tax is considered a major source of government revenues that has played a vital role in financing public services and infrastructure, which are essential for fostering economic development (Keen & Mansour, 2018). It has served as a primary source of government revenue in Nepal, facilitating public expenditure on infrastructure, education, health, and social welfare programs (Khadka, 2018). It is essential for funding public services and infrastructure projects, thus creating a foundation for economic development (Shrestha, 2022). However, the country's income tax system faces challenges including a narrow tax base, widespread tax evasion, and administrative inefficiencies, which hinder optimal revenue collection and equitable wealth distribution (Adhikari, 2020). Strengthening tax administration and broadening the tax base is essential to enhancing revenue mobilization and fiscal stability. VAT is a more reliable revenue source in these economies due to its broad-based nature. It has helped stabilize government revenues, even amid economic downturns, supporting sustained public investment and consumption (Bird & Gendron, 2020). Despite its benefits, can be regressive, disproportionately affecting lower-income households, and its implementation can be complicated by compliance issues in the informal sector (Ebrill et al., 2001). The effectiveness of taxation in driving GDP growth in developing economies is often limited by challenges such as a narrow tax base, tax evasion, and administrative inefficiencies (Fjeldstad & Heggstad, 2016). Additionally, in economies like Nepal, VAT provides a relatively stable revenue stream but also faces issues related to compliance and the regressive nature of consumption taxes, which disproportionately affect lower-income households (Adhikari & Pant, 2020).

The investment including domestic and foreign has another critical financial element that directly impacts capital formation, productivity, and employment. It has been playing crucial roles in capital formation, job creation, and productivity improvements, which are essential for sustained GDP growth. In developing economies, attracting and sustaining investment is often challenging due to political instability, inadequate infrastructure, and regulatory barriers (Asiedu, 2006). In Nepal domestic and foreign investments are crucial for fostering industrial growth, enhancing productivity, and generating employment, thereby directly impacting GDP growth (Poudel & Bhattarai, 2019). Nepal, in particular, struggles with creating a conducive environment for investment, which hampers its ability to achieve higher levels of economic growth (Poudel & Bhattarai, 2019).

Remittances, a significant financial inflow for many developing countries, have played a vital role in enhancing household incomes, driving consumption, and supporting small-scale investments (Ratha, 2013). While remittances contribute positively to GDP, overreliance on them can lead to economic vulnerabilities, particularly when these inflows fluctuate due to global economic conditions (Adams, 2011). Remittances have constituted a vital component of Nepal's economy, accounting for a significant portion of GDP and serving as a lifeline for many households (World Bank, 2021). They have contributed to poverty reduction, increased household consumption, and investment in health and education sectors (Pant, 2011). Remittances, which account for a substantial portion of Nepal's GDP, have become a lifeline for many households, driving consumption and investment at the grassroots level (Sapkota, 2018). Nonetheless, over-reliance on remittances exposes the economy to external shocks and may lead to labour shortages in domestic markets (Sapkota, 2013). Diversifying the economy and creating domestic employment opportunities are imperative to mitigate these vulnerabilities.

Nepal is a developing nation with a mixed economy and significant reliance on agriculture and remittances. This study has endeavored to understand the impact of these fiscal and financial elements that have formulated effective economic policies for long-term growth and development. This study has focused on income tax and VAT as fiscal elements, and remittances and investment as financial elements. Moreover, this study aimed to analyze the impact of such elements on the growth and development of Nepal, which is crucial in shaping the Gross Domestic Product (GDP) and development. For this, an effort has been made by the interplay between these complex elements, as each has distinct mechanisms that affect economic growth and development in the long run.

Reviewing these previous works of literature on income tax, VAT, remittances, and investment, this study has integrated to analyze Nepal's economic prosperity. Each element has been presenting unique opportunities and challenges. This study has focused on countries to maximize economic development and growth sustainability by addressing the significance and challenges in these fiscal and financial components. However, the effectiveness of these elements depends on how they are managed and integrated into the broader economic framework. Future policies should focus on optimizing taxation, improving the efficiency of government spending, attracting more investment, and channeling remittances into productive sectors to ensure sustainable development. Understanding their impact has been essential for policymakers and other stakeholders to design strategies that promote sustainable and inclusive economic growth and development in Nepal.

Literature Review

Theoretical perspectives on the impact of taxation, government spending, investment, and remittances on growth and development have evolved significantly from the previous works. The neoclassical growth theory posited that taxation and government spending influenced the economy by affecting capital accumulation and productivity (Solow, 1956). Recent studies extended this by examining the distortionary effects of high taxes on private investment, which dampened economic growth (Shrestha & Singh, 2017). Conversely, the Keynesian theory suggested that government investment, particularly during economic downturns, stimulated demand and drove growth (Keynes, 1936). These views were supported by empirical research, emphasizing the role of public investment in infrastructure, in fostering development (Bhusal & Sapkota, 2018). Investment including domestic and foreign, remained crucial for growth, with the endogenous growth theory highlighting the role of technological spillovers from FDI in enhancing productivity (Romer, 1990). Remittances were analyzed through the lens of development economics, seen as a vital source of external financing for developing countries, with theories emphasizing their role in poverty alleviation and income stabilization (Adhikari, 2018).

Aslam and Shah (2017) used a panel data approach across multiple developing countries to analyze the relationship between tax revenue and GDP growth. Their findings indicated that higher tax revenues improved public services and infrastructure, and excessive taxation hindered private investment, thus slowing economic growth. Conversely,

Ochieng and Ahmed (2019) employed a case study method focusing on sub-Saharan African countries and found that progressive tax systems contributed to income equality, indirectly fostering economic development. In Nepal, Shrestha and Singh (2017) utilized a time-series analysis to examine the impact of tax revenue on GDP growth. Their findings indicated that while tax reforms introduced post-2015 improved revenue collection, the high tax burden on businesses potentially discouraged private-sector investment. Similarly, Pandey (2019) utilized a regression analysis and found that indirect taxes, such as VAT, had a more significant positive effect on economic growth than direct taxes, and suggested that the contribution of taxation was highly influenced in Nepalese economic outcomes.

Chatterjee and Chakraborty (2018) used time-series analysis to examine the impact of government expenditure on economic growth in South Asian countries. Their results revealed that targeted government spending on education and health positively correlated with long-term economic growth. Similarly, Ali and Yusuf (2020) conducted a comparative analysis of government spending patterns in infrastructure and social welfare in Southeast Asia, concluding that investments significantly contributed to poverty reduction and economic development. Bhusal and Sapkota (2018) used a panel data approach to analyze the relationship between government expenditure and economic development in Nepal. Their study concluded that increased spending on infrastructure projects, post-earthquake, inspired economic recovery and growth.

Mwangi and Kimani (2016) employed a cross-sectional analysis to investigate the impact of foreign direct investment (FDI) on economic growth in East African countries. They found that FDI inflows significantly boost GDP growth by providing capital, technology, and managerial expertise. On the other hand, Awan and Ali (2019) used a mixed-method approach to explore the role of domestic investment in Pakistan, finding that domestic investments in the manufacturing and services sectors were critical for sustainable economic growth. Poudel and Dhungana (2020) employed a mixed-method approach, combining quantitative analysis with case studies, to investigate the impact of foreign direct investment (FDI) on Nepal's economic development. Their research highlighted that FDI inflows had a relatively low impact on sectors like hydropower and tourism. On the other hand, domestic investment, particularly in small and medium enterprises (SMEs), was hampered by a lack of access to finance and bureaucratic hurdles, as noted by Koirala (2016).

Ahmed and Zafar (2017) conducted a longitudinal study on remittances in South Asia, finding that remittances play a vital role in poverty alleviation and income stability. Their study utilized household surveys to analyze the socio-economic impact of remittances on recipient families. In contrast, Ratha et al. (2020) employed econometric modeling to assess the macroeconomic effect of remittances on economic growth in sub-Saharan Africa. Their findings indicated that while remittances contributed to immediate consumption and poverty reduction, their impact on long-term economic growth was contingent on the effective utilization of these funds in productive investments. Research by Adhikari (2018) used household survey data to examine the impact of remittances on poverty reduction and economic stability in Nepal. The study found that remittances were critical in improving household income and consumption levels, particularly in rural areas. However, Dahal and Sapkota (2021) pointed out that while remittances contributed to immediate economic relief, their long-term impact on sustainable development was limited due to the lack of productive investments in remittance-receiving households.

The literature concluded that taxation would have the foundation for economic growth if well-structured on the necessary public goods and services. Investments have been realized as essential for capital accumulation and technological advancement. Remittances, although found to be used for consumption, would have an impact on development if channeled into productive investments. The effectiveness of these factors depends on the governance structures and policy frameworks within these economies. Reviewing the previous literature, this study underscored that taxation, investment, and remittances have been central to Nepal's economic growth and development, providing a new gap in past analysis.

Research Methodology

Data and Its Sources

This study was based on empirical research to establish the relationship between economic development and fiscal and financial dynamics in Nepal, employing robust ordinary least square (OLS) after inspecting a two-stage Engle-Granger cointegration analysis regression model with 30 years annual series spanning from 1993 to 2022. This study was based on secondary data sources, collected via Nepal Rastra Bank (NRB) open database. The relationship between income tax, VAT, remittance, investment, and GDP was studied in this study. Descriptions of variables are presented in Table 1.

Table 1: Descriptions of Variables

Variables	Proxy	Measurements	Sources
GDP	Economic development	Rs. In million	NRB, 2022
REM	Remittance	Rs. In million	NRB, 2022
INV	Investment	Rs. In million	NRB, 2022
VAT	Value-Added Tax	Rs. In million	NRB, 2022
IT	Income Tax	Rs. In million	NRB, 2022

Model Specification of Data Analysis Tools

This study applied both descriptive and inferential tools to analyze data. Descriptive techniques were used to examine the fiscal and financial situation of the Nepalese economy. Similarly, an inferential technique was used to measure the relationship between the income tax, VAT, remittance, investment, and GDP, utilizing the time series data of the Nepalese economy by a two-step model. To construct long-run and short-run regression models, the variables were integrated of order one (i.e., they had a unit root and became stationary after first differencing), considering the residual unit root of the long-run regression at the first difference, proceeding as subsequently.

When variables were non-stationary at levels but became stationary after differencing a co-integration test was determined if a long-run relationship existed between them. If such a relation was found, the long-run regression model was formulated as:

$$GDP_t = \alpha_0 + \beta_1 IT_t + \beta_2 VAT_t + \beta_3 REM_t + \beta_4 INV_t + \epsilon_t \dots\dots\dots\dots 1$$

Where GDP_t = Gross Domestic Product at time t, IT_t = Income Tax at time t, VAT_t = Value-Added Tax at time t, REM_t = Remittances at time t, INV_t = Investment at time t, and ϵ_t = Error term representing the long-run equilibrium residuals, and α_0, β_1, β_2, β_3, and β_4 = Long-run coefficients. The log transformation of (1) was as:

$$logGDP_t = \alpha_0 + \beta_1 logIt_t + \beta_2 logVAT_t + \beta_3 logREM_t + \beta_4 logINV_t + \epsilon_t \dots\dots\dots (2)$$

The augmented Dickey-Fuller test (ADF) of the unit root for residual was employed to determine whether the long-run relationship or cointegration exists or not, allowing an error correction model (ECM)—called the Engel-Granger and the augmented Engel-Granger tests (Gujarati, et al., 2009) for short-run dynamics. The study, however, didn't find any evidence of cointegration between variables of interest. Thus, the study applied robust OLS techniques to avoid the sporous results based on the equation (3).

$$\Delta logGDP_t = \alpha_0 + \beta_1 \Delta logIt_t + \beta_2 \Delta logVAT_t + \beta_3 \Delta logREM_t + \Delta\beta_4 logINV_t + \epsilon_t \dots(3)$$

Results and Discussion

Descriptive and Trend Analysis

This study started from the descriptive statistics of the variables of interest—GDP, IT, VAT, REM, and INV of the Nepalese economy, measured in millions of rupees from FY 1993 to 2022. The descriptive measure provided the nature of the time series in analysis to determine the trend and situation of the Nepalese economy in an eye short. The descriptive summary of the studied variables from FY 1993 to 2022 is in Table 2.

Table 2: Descriptive Summary of Gross Domestic Product, Income Tax, Value-Added Tax, Remittance, and Investment (FY 1993-2022) in Million Rupees

Descriptions	GDP	VAT	REM	INV	IT
Mean	1361259	68834.47	265888.5	333047.0	66145.70
Median	771742.5	27955.65	123419.5	165891.5	18436.90
Maximum	4105501	240121.3	853944.1	1164940.	361936.7
Minimum	171474.0	4007.700	223.0000	37278.00	1281.300
Std. Dev.	1243665	76165.90	296324.7	343722.5	93460.43
Skewness	0.959031	1.042611	0.749418	1.205069	1.806139
Kurtosis	2.590739	2.666046	2.030667	3.261412	5.495040
Jarque-Bera	4.808066	5.574595	3.982644	7.346377	24.09222
Probability	0.090353	0.061587	0.136515	0.025395	0.000006

Note. GDP = Gross Domestic Product, IT = Income Tax, VAT = Value-Added Tax, Rem. = Remittance, INV. = Investment, from Quarterly Bulletin of Nepal Rastra Bank (2022).

Table 2 reveals that the mean indicates the averages of all studied variables, while the median shows the mid-values during the study period. Similarly, the standard deviation depicts the dispersion from the mean values. Likewise, Skewness measures 0 for normal, while the maximum of 3 mirrors the Mesokurtik, and greater and less than 3 indicates Leptokurtic and Platokurtic respectively. Finally, Jarque-Bera test statistics measure the difference between Skewness and Kurtosis of these time series data with this form of normal distribution. The JB statistics are said to be normal if the probabilities are greater than 5%. Thus, GDP, VAT, and REM are normally distributed, while INV and IT are not normally distributed during the study period. Based on the trends of such macroeconomic data over the study period are depicted in Figure 1.
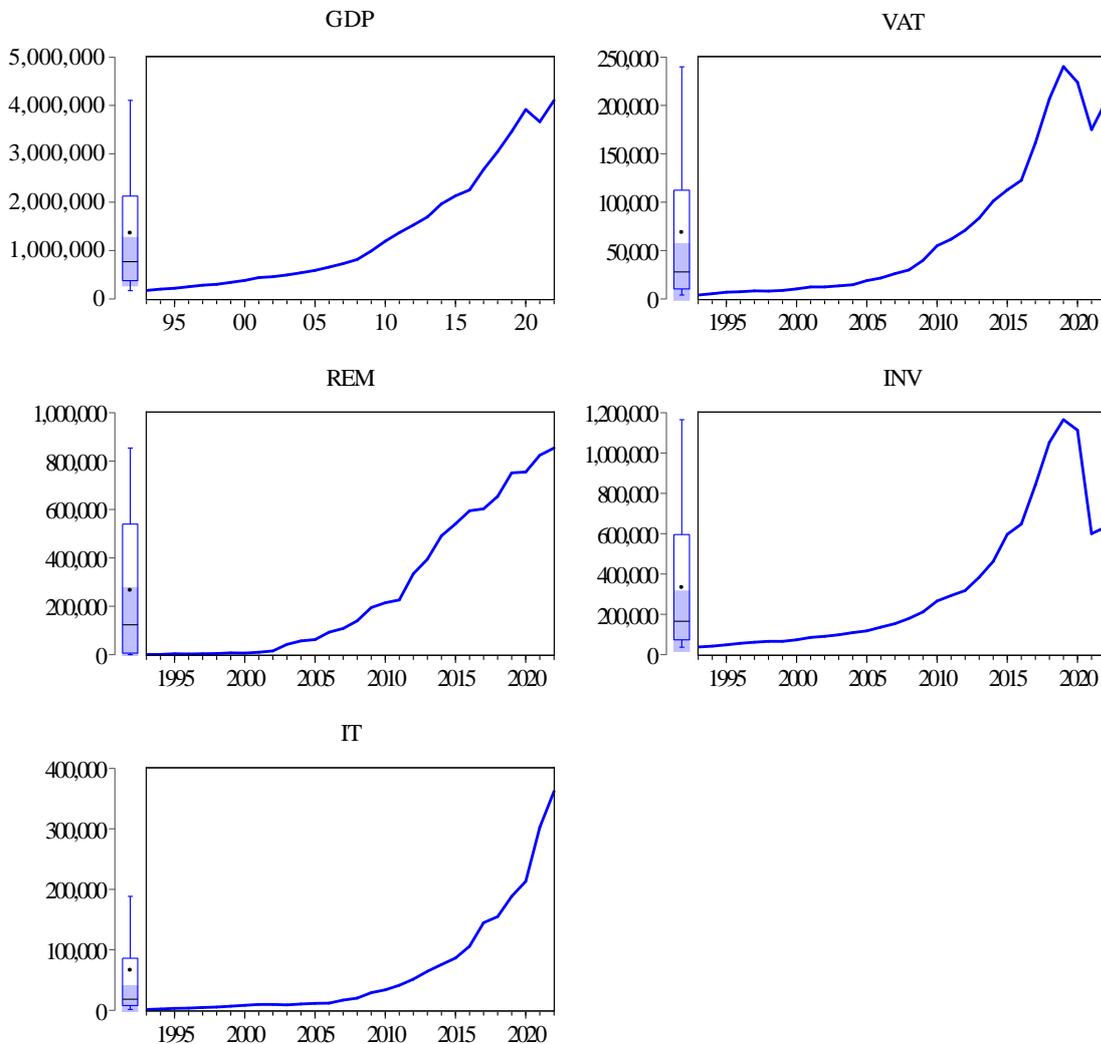
Figure: Macroeconomic Data

Figure 1 reveals that raw figures of the GDP, IT, VAT, REM, and INV, increased over the study period except in 2019/20 due to COVID-19. Later they were recovered. Among these variables, the country's economy has been highly dependent upon remittances, and income tax which have been increasing last two years. Similarly, investment and VAT were slugged in recent years. Furthermore, box plots were used to compare the mean and median through their thick lines and shadow areas, revealing that the mean G increased less than the median, indicating that the increase in GDP was a lower trend during the years. Likewise, with the others' elements, they were visualized as lower trends. In sum, all studied macroeconomic variables of the Nepalese economy performed worse performance during the study periods.

Unit Root Test of All Variables

Unit root tests of all variables were employed to determine whether this time series dataset was non-stationary and contained a unit root. This indicated that variables were affected by random shocks and tended to return to their mean over time, suggesting a lack of long-term trend or stability. ADF test of the unit root of all dependent and independent variables was utilized in this study, and the results were obtained in Table 3, underlying the hypothesis: H_0: The variable has a unit root.

Table 3: Augmented Dickey-Fuller Test of Unit Root

Variables	At Level with Constant		At First Difference with Constant		
	t-test	p-value	t-test	p-value	Stationary
$\log GDP_t$	-0.6253	0.8499	-4.8985	0.0005	I(1)
$\log IT_t$	-6.6853	0.8352	-4.6852	0.0009	I(1)
$Lnvat_t$	-0.9954	0.7414	-3.837	0.007	I(1)
$Lnrem_t$	-1.8163	0. 3655	-8.6354	0.000	I(1)
$Lninv_t$	-1.1649	0.6756	-3.8116	0.0075	I(1)

Table 3 shows that the ADF test of the unit root of all dependent and independent variables was insignificant at level, they have unit root at level data, and all the series were stationary at first difference. Thus, the order of integration of variables is $I(1)$, indicating regression at level data may lead to a spurious relationship.

Relationship wetween GDP and Fiscal and Financial Variables

The paper attempts to establish the relationship between GDP and intended fiscal and financial variables. The ordinary least square (OLS) estimation process is reported in Table 4.

Table 4: Relationship Between GDP and Fisal and Financial Variables

$\log GDP_t = 2.828 + 0.2902 \log IT_t + 0.3236 \log VAT_t + 0.0304 \log REM_t + 0.0445 \log INV_t$					
SE	= 0.1356	0.0440	0.1080	0.0119	0.0903
T-Stat.	= 20.846	6.593	2.983	2.545	0.492
P-value	= 0.000	0.000	0.006	0.0175	0.627
(R-squared = 0.99766, F-stat. = 2667.965 at p =0.000, and D-W = 0.9865)					

The GDP_t estimation findings showed a mixed result in the first step model. The estimation showed that all variables have a positive relationship with GDP; however, only $\log IT_t$, $\log VAT_t$, and $\log REM_t$ significantly influenced the GDP in Nepal. The results show that income tax, value-added tax, and remittance may contribute to the productivity of Nepal thereby increasing GDP. On the flip side, the findings were found spurious, because of the R^2 standing at 0.997. Despite this, the F statistic was significant (F-stat. = 2667.965 at p =0.000), and the value of D-W (0.9865) was less than R^2, indicating a spurious for the estimation of GDP. To avoid spurious estimation, the paper has attempted to apply the residual stationarity test for cointegration to estimate the error correction model.

Test of Residual Based Cointegration Test

Engle-Granger two-stage cointegration test was applied to determine whether there was a long-run association between GDP and anticipated regressors or not. The residual series was exacted from the OLS estimations as estimated in Table 4 and testing for the null hypothesis is the residual has a unit root. The t-statistic of the residual ADF unit root test was -3.87403 and 5% critical is calculated when N = 5 and T = 30 as restated by MacKinnon (2010):

$$\text{Critical value} = \quad + \frac{1}{T} + \frac{2}{T^2} + \frac{3}{T^3}$$

$$= - 4.71\,537 - \frac{17.3569}{30} - \frac{22.660}{30^2} + \frac{91.359}{30^3} = -5.31574$$

Now, the absolute value of the computed t-statistic is less than the absolute value of 5% critical value, indicating the null hypothesis is accepted, implying no long-run relationship or cointegration between variables of interest. The error correction mechanism thus cannot be allowed in this study. The paper, therefore, has applied the robust OLS model to estimate the relationship between GDP and fiscal and financial variables with stationary series by differencing each. Additionally, this estimation may help to minimize the spurious results in OLS.

Robust Estimation of Relationship between GDP and Fiscal and Financial Variables

Considering the first OLS results, the study applied another OLS regression with stationary series, allowing robust and non-spurious estimations. The results are presented in Table 5. The estimated OLS results are statistically fitted and well-estimated. Approximately 70% variation in GDP was explained by the regressors as indicated by R^2. Furthermore, the significant F-statistic revealed that the overall estimation was fitted and robust. On the flip side, DW

statistic (1.974572) was approximately 2, implying the model was free from autocorrelation. The overall results thus confirm that the OLS estimation is statistically robust.

Table 5: Robust Relationship Between GDP and Fisal and Financial Variables

Variables	Coefficient	Std. Error	t-Statistic	Prob.
log*INV*	0.139415	0.063974	2.179251	0.0394
log*IT*	0.055306	0.055869	0.989925	0.3321
log*REM*	-0.014885	0.010269	-1.449490	0.1601
log*VAT*	0.174467	0.082716	2.109229	0.0455
C	0.028349	0.005355	5.294170	0.0000
R-squared	0.700781	Akaike info criterion		-5.748104
Adjusted R-squared	0.650911	Schwarz criterion		-5.512363
S.E. of regression	0.012641	Hannan-Quinn criteria		-5.674273
Log likelihood	88.34750	Durbin-Watson statistic		1.974572
F-statistic	14.05219	Prob(F-statistic)		0.000005

The OLS results of Table 5 revealed that only investment (INV) and VAT significantly influenced economic development (GDP) at a 5% level of significance in Nepal. Moreover, the OLS result indicated that a 1% increase in investment and VAT rose the GDP by 0.139415% and 0.174467% respectively. It is observed that investment is the main source of human and physical capital formation which enhances productivity, innovation, and technical progress thereby improving the GDP of the nation, which was similar to the previous studies (Dangal & Gajurel, 2022; Dangal et al., 2022; Milbourne et al., 2003). On the other hand, VAT is the major source of revenue for the government as found in previous studies (Simionescu & Albu, 2016; Zhuravleva et al., 2020); and through domestic resource mobilization, GDP can be increased. Thus, this study concludes that the value-added tax and investment are vital for the growth of Nepal. While, on the other hand, income tax and remittances are insignificant, indicating that these fiscal and financial sources of Nepal's income are used for otherwise purposes rather than channeling for GDP growth. However, with remittance and income tax, the VAT and investment may enhance productivity and thus might be vital for Nepal's development.

The Coefficient and Residual Diagnostic and Stability Test of the Model

Diagnostic and stability tests are essential to ensure the robust results of OLS and avoid econometric problems. The coefficient and residual diagnostic test results are demonstrated in Table 5.

Table 6: Diagnostic Test of OLS Results

Diagnostic test	Test statistic	p-value
Heteroskedasticity	2.520474	0.6410
Serial Correlation	0.526420	0.7686
Normality	1.171356	0.556728
Functional Form	0.784772	0.3849

The results of Table 5 reveal that the null hypothesis of the Breusch-Pagan-Godfrey heteroskedasticity test, the Breusch-Godfrey serial correlation LM test, the Ramsey RESET test, and the normality test (Jarque-Bera) is accepted. Thus, the model is free from heteroskedasticity, serial correlation, and functional form misspecification, and residual or series is normally distributed. The COSUM and CUSUM-squared were performed for stability of the model, and the result is presented in Figure 2. The plot of CUSUM and CUSUM of square lies between 95% confidence interval, implying the OLS model is stable and well-fitted.
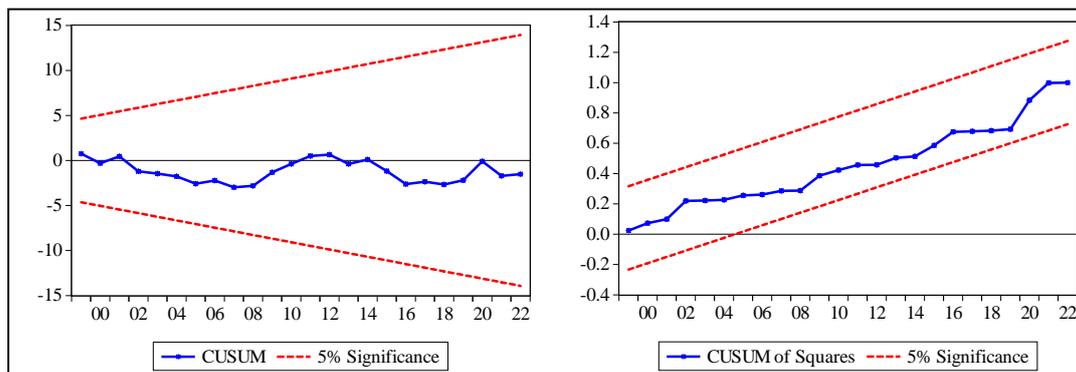

Figure 2: Plot of CUSUM and CUSUM of Square

Conclusion

Employing OLS techniques, the study concludes that value-added tax (VAT)—fiscal elements, and investment as financial elements are essential drivers of GDP growth in Nepal. Conversely, income tax and remittances show limited influence in the robust model, suggesting these resources might not be effectively utilized for immediate economic growth. The findings highlight the need for a more strategic allocation of income tax revenues and remittances to maximize their impact on GDP. This study, thus, suggested that the fiscal policy should be strengthened to better utilize income tax and remittance inflows for productive investments that contribute to GDP growth. Similarly, an investment-friendly environment should be promoted to investment to sustain long-term economic growth. Finally, monitoring and evaluation should be regularized to assess the effectiveness of VAT and investment policies to ensure they continue to drive economic growth and address any emerging challenges. These actions could enhance Nepal's economic resilience and growth trajectory.

References

Adams, R. H. (2011). Evaluating the economic impact of international remittances on developing countries using household surveys: A literature review. *Journal of Development Studies*, *47*(5), 685-690. https://doi.org/10.1080/00220388.2010.533710

Adams, R. H., Jr., & Cuecuecha, A. (2010). The economic impact of international remittances on poverty and household consumption and investment in Indonesia. *World Development*, 39(1), 89-101. https://doi.org/10.1016/j.worlddev.2010.05.004

Adhikari, B. (2020). Challenges in Income Tax Administration in Nepal. *Journal of Finance and Management Review*, *5*(2), 45-58. https://doi.org/10.3126/jfmr.v5i2.30210

Adhikari, P. (2018). The role of remittances in poverty reduction in Nepal. *Journal of Development Studies, 54*(7), 1122-1136. https://doi.org/10.1080/00220388.2018.1446290

Adhikari, P. K., Pandey, A., & Shrestha, Z. (2023). Dynamics of financial development and foreign direct investment on Nepal's economic growth: A NARDL analysis. *Economic Review of Nepal*, 6(1), 1-15. https://doi.org/10.3126/ern.v6i1.67967

Ahmed, S., & Zafar, M. (2017). The impact of remittances on poverty and income distribution in South Asia: Evidence from panel data. *Journal of South Asian Development, 12*(2), 211-229. https://doi.org/10.1177/0973174117702836

Ali, H., & Yusuf, S. (2020). Government spending and economic development: A comparative study of Southeast Asia. *Economic Development Quarterly, 34*(3), 234-250. https://doi.org/10.1177/0891242420920105

Asiedu, E. (2006). Foreign direct investment in Africa: The role of natural resources, market size, government policy, institutions, and political instability. *The World Economy*, 29(1), 63-77. https://doi.org/10.1111/j.1467-9701.2006.00758.x

Aslam, M., & Shah, Z. (2017). Taxation and economic growth: A panel data analysis of developing countries. *International Journal of Economics and Finance, 9*(2), 45-58. https://doi.org/10.5539/ijef.v9n2p45

Awan, A., & Ali, R. (2019). Domestic investment and economic growth: Evidence from Pakistan. *Journal of Economic Studies, 46*(4), 123-136. https://doi.org/10.1108/JES-12-2018-0467

Bhattarai, K. (2019). Foreign direct investment in Nepal: Trends, prospects, and challenges. *Nepal Economic Forum Discussion Paper*, *3*(1), 10-22. Retrieved from https://nepaleconomicforum.org/publications

Bhusal, B., & Sapkota, M. (2018). Government spending and economic development in Nepal: An empirical analysis. *Economic Journal of Nepal, 41*(4), 25-40. https://doi.org/10.3126/ejon.v41i4.22454

Bird, R. M., & Gendron, P. P. (2020). *The VAT in developing and transitional countries*. Cambridge University Press. https://doi.org/10.1017/CBO9780511610488

Chatterjee, S., & Chakraborty, I. (2018). Government spending on education and health in South Asia: A time-series analysis. *South Asian Journal of Macroeconomics and Public Finance, 7*(1), 56-75. https://doi.org/10.1177/2277978718756307

Dahal, M., & Aryal, P. (2020). Role of investment in economic growth of Nepal. *Journal of Economic Studies*, *28*(1), 75-88. https://doi.org/10.3126/jes.v28i1.33820

Dahal, R., & Sapkota, M. (2021). Remittances and sustainable development in Nepal: A critical analysis. *Nepalese Journal of Economics, 5*(1), 45-60. https://doi.org/10.3126/nje.v5i1.32761

Dangal, D. N., & Gajurel, R. P. (2022). Trade off between military expenditure and fixed capital formation on economic growth: Panel study of some SAARC and ASEAN countries. *Journal of Nepalese Management and Research*, *4*(1), 23-35. https://doi.org/10.3126/jnmr.v4i1.52778

Dangal, D.N., Gajurel, R. P., & Pokhrel, A. (2022). Social overhead capital and output nexus in Nepal: A Toda-Yamamoto causality analysis. *Economic Journal of Nepal*, *45*(3-4), 23-40. https://doi.org/10.3126/ejon.v45i3-4.63146

Ebrill, L., Keen, M., Bodin, J. P., & Summers, V. (2001). *The modern VAT*. International Monetary Fund. https://doi.org/10.5089/9781589060265.071

Fjeldstad, O. H., & Heggstad, K. (2016). Taxation, aid, and democracy: The evolution of tax systems in Namibia, Tanzania, and Uganda. *Journal of Modern African Studies*, 54(3), 539-560. https://doi.org/10.1017/S0022278X16000392

Gajurel, R. P., Adhikari, P. K., Lamichhane, K. P., Niroula, A., Humagain, S., & Niraula, P. (2021). Asymmetrical and symmetrical relationship between financial sector development and economic growth: Evidence from Nepal. *Economic Review of Nepal, 4*(1), 1-20. https://doi.org/10.3126/ern.v4i1.64113

Gani, A. (2017). The effect of remittances on economic growth in developing countries. *Economic Analysis and Policy*, 56, 31-38. https://doi.org/10.1016/j.eap.2017.08.002

Gujarati, D. N., Porter, D. C. & Gunasekar, S. (2009). *Basic econometrics* (5th Ed.). McGraw-Hill/Irwin

Keen, M., & Mansour, M. (2018). Revenue mobilization in sub-Saharan Africa: Challenges from globalization. *World Development*, *32*(4), 1065-1084. https://doi.org/10.1016/j.worlddev.2018.01.002

Keynes, J. M. (1936). *The general theory of employment, interest, and money*. Macmillan.

Khadka, R. B. (2005). *VAT in Nepal: Theory and practice*. Ratna Pustak Bhandar.

Khadka, R. B. (2018). *Tax laws and tax administration in Nepal*. Buddha Academic Publishers.

Koirala, B. (2016). Barriers to domestic investment in Nepal: An empirical study. *Journal of Business and Economic Development, 21*(2), 78-91. https://doi.org/10.3126/jbed.v21i2.15416

MacKinnon, J. G. (2010). *Critical values for cointegration tests* (Queen's Economics Department Working Paper, No. 1227). Queen's University. https://www.econ.queensu.ca/sites/econ.queensu.ca/files/wpaper/qed_wp_1227.pdf

Milbourne, R., Otto, G., & Voss, G. (2003). Public investment and economic growth. *Applied Economics*, *35*(5), 527-540. https://doi.org/10.1080/0003684022000015883

Mwangi, J., & Kimani, P. (2016). The role of foreign direct investment in economic growth: A study of East African economies. *Journal of African Business, 17*(2), 170-190. https://doi.org/10.1080/15228916.2016.1141238

Ochieng, V., & Ahmed, T. (2019). Progressive taxation and income equality in sub-Saharan Africa: A case study approach. *Review of African Political Economy, 46*(160), 589-605. https://doi.org/10.1080/03056244.2019.1657896

Pandey, A., Adhikari, P. K., & Shrestha, Z. (2022). Financial reforms and financial development in Nepal: A Review. *Economic Review of Nepal*, *5*(1), 18-33. https://doi.org/10.3126/ern.v5i1.66037

Pandey, R. (2019). The impact of tax structure on economic growth in Nepal. *South Asian Economic Review, 15*(3), 243-260. https://doi.org/10.1177/0973703020190305

Pant, B. (2011). Harnessing remittances for productive use in Nepal. *Economic Review*, 23(2), 1-20. Retrieved from https://nrb.org.np/economic-review

Poudel, B., & Bhattarai, K. (2019). Foreign direct investment and economic growth in Nepal. *International Journal of Economics and Financial Research*, *5*(6), 170-182. https://doi.org/10.32479/ijefr.v5i6.9001

Poudel, L., & Dhungana, S. (2020). Foreign direct investment in Nepal: Trends and impact on economic development. *Journal of International Business and Economics, 8*(1), 15-28. https://doi.org/10.15640/jibe.v8n1a2

Ratha, D. (2013). *The impact of remittances on economic growth and poverty reduction in developing countries.* Migration Policy Institute. https://doi.org/10.2139/ssrn.3251181

Ratha, D., De, S., & Plaza, S. (2020). Remittances and development: Evidence from sub-Saharan Africa. *World Development, 132*, 104958. https://doi.org/10.1016/j.worlddev.2020.104958

Romer, P. M. (1990). Endogenous technological change. *Journal of Political Economy, 98*(5), S71-S102. https://doi.org/10.1086/261725

Sapkota, C. (2013). Remittances in Nepal: Boon or Bane? *The Journal of Development Studies*, *49*(10), 1316-1331. https://doi.org/10.1080/00220388.2013.812196

Sapkota, C. (2018). Remittances and economic growth in Nepal: A macroeconomic perspective. *South Asia Economic Journal*, *19*(1), 1-22. https://doi.org/10.1177/1391561418758383

Shrestha, M. (2008). Impact of remittances on poverty and inequality in Nepal. *South Asia Economic Journal*, 9(2), 331-353. https://doi.org/10.1177/139156140800900204

Shrestha, M. (2022). Taxation and economic growth in Nepal: A dynamic analysis. *Journal of Applied Economics*, *54*(2), 89-105. https://doi.org/10.1080/00036846.2021.1875611

Shrestha, M., & Singh, R. (2017). Tax reforms and economic growth in Nepal: A time-series analysis. *Economic Journal of Development Issues, 22*(2), 17-32. https://doi.org/10.3126/ejdi.v22i2.18744

Shrestha, S., & Acharya, S. (2021). VAT compliance issues in Nepalese context. *International Journal of Accounting and Taxation*, *9*(1), 23-35. https://doi.org/10.15640/ijat.v9n1a3

Simionescu, M., & Albu, L. L. (2016). The impact of standard value added tax on economic growth in CEE-5 countries: econometric analysis and simulations. *Technological and Economic Development of Economy*, *22*(6), 850-866.https://doi.org/10.3846/20294913.2016.1244710

Solow, R. M. (1956). A contribution to the theory of economic growth. *The Quarterly Journal of Economics, 70*(1), 65-94. https://doi.org/10.2307/1884513

World Bank. (2020). *World development indicators*. World Bank. https://databank.worldbank.org/source/world-development-indicators

World Bank. (2021). *Migration and Development Brief 34*. World Bank Publications. https://www.worldbank.org/en/topic/migrationremittancesdiasporaissues

Zhuravleva, I. A., Nazarova, N. A., & Grundel, L. P. (2020). Value added tax: problems affecting GDP. In *Scientific and Technical Revolution: Yesterday, Today and Tomorrow* (pp. 1642-1652). Springer International Publishing. https://doi.org/10.1007/978-3-030-47945-9_175

Factors Associated with Skill Birth Attendance among the Reproductive Age of Women in Madhesh Province, Nepal

Bijaya Mani Devkota, Ph.D.
Lecturer, Central Department of Population Studies (CDPS),
Tribhuvan University (TU), Kathmandu, Nepal
Email: devkotabm2006@gmail.com

Abstract

Skilled birth attendance (SBA) is vital for reducing maternal and neonatal mortality. Despite national efforts, disparities in SBA utilization persist, influenced by socio-demographic factors such as socioeconomic status, education, and geographic location. This study utilized data from the 2022 Nepal Demographic and Health Survey (NDHS) involving 734 women of reproductive age in Madhesh Province. Logistic regression was applied to determine the influence of variables like age, birth order, religion, caste/ethnicity, educational attainment, place of residence, and wealth index on the likelihood of SBA-assisted delivery. The analysis revealed significant predictors of SBA utilization. Women aged 30-49 were more likely to utilize SBA services (OR = 3.111, p = .023). Higher birth order was associated with a decreased likelihood of SBA utilization (OR = .15, p < .001), indicating that experience with childbirth might influence the perception of need for skilled attendance. Women with higher educational attainment showed a greater probability of SBA-assisted delivery (OR = 3.983, p = .035), emphasizing the role of education in health service utilization. Additionally, wealth was a strong predictor, with the richest women showing the highest likelihood of SBA assistance (OR = 5.755, p = .004). Contrarily, variables such as rural residence and certain caste/ethnicity groups did not significantly predict SBA usage. The study underscores that age, educational attainment, and wealth are significant determinants of SBA utilization. These findings highlight the need for targeted interventions to enhance maternal health services, focusing particularly on educational and economic empowerment to bridge the utilization gap. The insights provided could inform policy makers and health practitioners in designing interventions that cater to the diverse needs of the population.

Keywords: SBA, Madhesh Province, Factors association, Women, Utilization

Introduction

In Madhesh Province, Nepal, the provision of skilled birth attendance (SBA) is crucial for reducing maternal and neonatal mortality rates. The World Health Organization advocates for SBA as it ensures timely management and referral of pregnancy-related complications. Despite national efforts to enhance maternal health status, substantial disparities in SBA utilization remain evident across different socio-demographic segments within the province (Ministry of Health and Population [MoHP], 2020; Pradhan et al., 2019). These disparities are influenced by a range of factors including socioeconomic status, educational levels, and geographic accessibility, which vary notably across the diverse communities of Madhesh Province. While numerous studies have highlighted the influence of socioeconomic factors on SBA services in Nepal, specific research focused on Madhesh Province is limited (Bhandari & Dangal, 2020). Research typically points to higher SBA utilization in urban versus rural settings; however, such studies rarely dissect the unique cultural and economic dynamics that characterize Madhesh Province (Shrestha et al., 2018). Additionally, the impact of Nepal's recent federal restructuring on maternal health services in the region has been underexplored, with preliminary data suggesting significant changes in local health service delivery (Kumar & Singh, 2021). There is also a notable gap in understanding how local governance and community health programs specifically support or impede access to skilled birth services (Gautam & Adhikari, 2019).

Further investigation is required to explore how caste and ethnicity influence SBA access in Madhesh. Preliminary evidence suggests stark disparities in healthcare access among different ethnic groups within the province, yet

detailed analyses remain scarce (Rai & Singh, 2019). The role of intersectional factors such as gender, poverty, and rural residency in shaping health-seeking behaviors for childbirth services also demands greater scholarly attention (Pathak & Malla, 2020; Singh & Basnet, 2022). The aim of this study is to address these identified gaps by analyzing the factors associated with skilled birth attendance among women in Madhesh Province, Nepal. This research will delve into how socio-economic status, education, ethnicity, and recent health policy reforms influence SBA utilization. By providing a detailed regional analysis, this study seeks to contribute meaningful insights into the barriers and facilitators affecting SBA uptake, thereby informing targeted policy interventions designed to improve maternal health services across this diverse province (Thapa & Sharma, 2023).

Literature Review

Socio-economic status (SES) is a significant determinant of SBA utilization. Several studies have demonstrated that women from higher socio-economic backgrounds are more likely to use skilled birth attendants. For instance, a study conducted in Ethiopia found that women with higher household incomes and better educational attainment were significantly more likely to have a skilled attendant at birth (Ayele et al., 2019). Similarly, Bohren et al. (2020) observed that financial constraints and lack of education were major barriers to accessing skilled birth care in several low- and middle-income countries (LMICs). The SBA utilization must address the economic and educational disparities that exist in this study.

Cultural and religious beliefs also play a crucial role in determining whether women seek skilled birth care. In many societies, traditional birth attendants (TBAs) are preferred over skilled professionals due to deeply ingrained cultural practices. A study in Nepal highlighted that women who adhered to traditional beliefs were less likely to seek SBA, opting instead for home births assisted by TBAs (Karkee et al., 2018). Similarly, research in Nigeria revealed that cultural practices and mistrust in formal health services led to low SBA utilization (Fapohunda & Orobaton, 2019). These findings underscore the need for culturally sensitive health promotion strategies that encourage the use of skilled birth attendants without alienating traditional practices.

The accessibility and availability of health services are critical determinants of SBA utilization. Women living in rural or remote areas often face significant barriers to accessing skilled birth care. According to a study in Bangladesh, geographic distance from health facilities was a major impediment to SBA utilization (Chowdhury et al., 2019). Furthermore, the availability of skilled personnel at health facilities is often limited, particularly in rural areas. A systematic review by Gabrysch and Campbell (2009) highlighted that the lack of nearby health facilities and trained professionals contributed to low SBA coverage in several LMICs. This studyindicates that improving infrastructure and ensuring the availability of skilled health personnel in underserved areas are crucial for increasing SBA utilization.

Antenatal care (ANC) is closely linked to SBA utilization. Women who attend regular ANC visits are more likely to use skilled birth attendants. Research conducted in Uganda found a strong association between the number of ANC visits and the likelihood of SBA utilization (Kabakyenga et al., 2017). Similarly, a study in Indonesia reported that women who received comprehensive ANC were more likely to deliver with a skilled attendant (Titaley et al., 2010). The promoting ANC attendance could be an effective strategy for increasing SBA utilization.

Women's empowerment and decision-making autonomy are also important factors influencing SBA utilization. Studies have shown that women who have greater autonomy in household decision-making are more likely to seek skilled birth care. A study in Kenya found that women who participated in household decisions were more likely to use skilled birth attendants compared to those who had little or no decision-making power (Fotso et al., 2009). Similarly, research in India revealed that women's empowerment, measured by their involvement in decision-making, was positively associated with SBA utilization (Singh et al., 2014). These findings highlight the importance of empowering women to make informed decisions about their health and the need for interventions that promote gender equality in health-seeking behaviors.

This study examines the predictors of Skilled Birth Attendance (SBA) among women of reproductive age. The predictors include age, religion, birth order, caste/ethnicity, educational attainment, place of residence, and wealth index. These variables are hypothesized to influence the likelihood of utilizing SBA during childbirth. Logistic regression has applied to analyze the relationship between these predictors and the outcome variable, SBA. The assessment of the relative contribution of each predictor in determining SBA, while controlling for potential confounders, to identify the most significant factors influencing skilled birth attendance.

Data and Methods

This study on factors associated with skilled birth attendance (SBA) among women of reproductive age in Madhesh Province, Nepal, utilizes data from the 2022 Nepal Demographic and Health Survey (NDHS). This survey collects detailed health indicators, focusing on maternal and child health and employing stratified sampling to ensure

representativeness across diverse socio-economic and geographical areas. For this analysis, data concerning SBA and related demographic, socio-economic, and health variables were extracted for about 734 women from Madhesh Province. These women, aged 15-49, reported at least one pregnancy in the three years prior to the survey. The variables analyzed included socio-economic status (education level, wealth index, employment), demographic factors (age, marital status, number of children), health-related aspects (access to healthcare facilities, antenatal care frequency, previous complications), and cultural factors (caste/ethnicity, religion). Logistic regression was employed to discern the significant predictors of SBA usage, calculating odds ratios to understand the strength of these associations.

Results and Discussion

Age: Age significantly influences the likelihood of skilled birth attendance (SBA). Older women, particularly those aged 30-49, are more likely to utilize skilled birth services compared to their younger counterparts. This trend suggests that with age, women might accumulate more health literacy or have greater access to healthcare resources, thereby increasing their use of skilled birth care. Understanding this relationship is crucial for targeting healthcare policies and interventions that aim to enhance maternal healthcare access across all age groups.
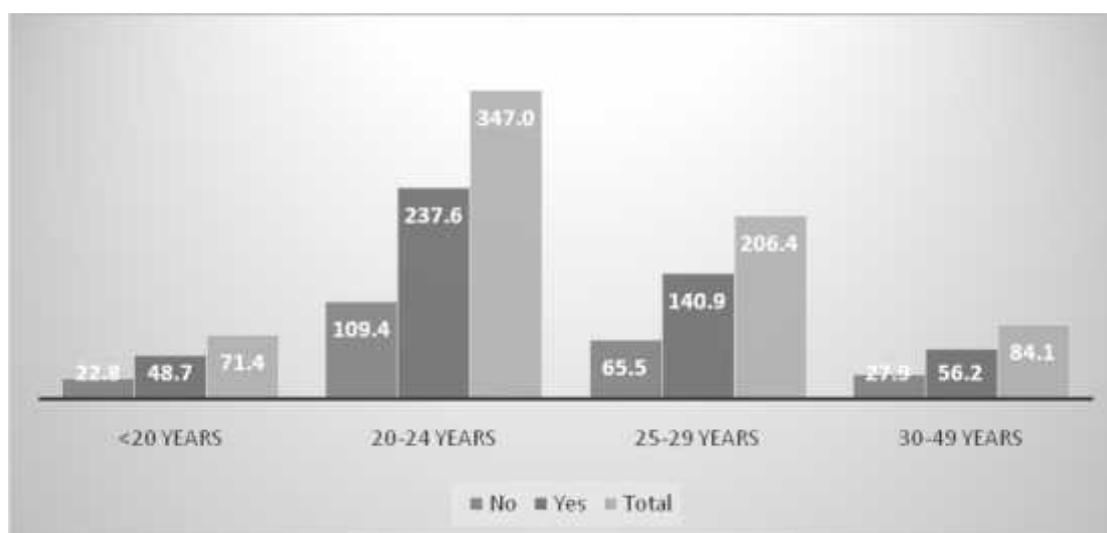

Figure 1: Distribution of respondents by age
Source: Nepal Demographic and Health Survey, 2022

Figure 1 shows that the distribution of respondents by age group and their reported use of skilled birth attendance (SBA), under 20 years, 20-24 years, 25-29 years, and 30-49 years, with percentages indicating the proportion of respondents within each age group who reported not using SBA ('No') and those who did ('Yes'), alongside the total percentage for each age group. Notably, the highest usage of SBA is observed in the 20-24 age group, with a decline seen in older age groups. Understanding these trends is crucial for targeting interventions aimed at increasing SBA utilization, particularly among the youngest and oldest age cohorts, who appear to utilize these services less frequently.

Religion: The relationship between religion and skilled birth attendance (SBA) reveals complex social and cultural dynamics influencing healthcare access. In many settings, religious beliefs and practices can significantly impact decisions regarding the use of skilled birth attendants. For example, certain religious groups may have traditional birth practices or preferences that sway them away from formal medical services. Additionally, disparities in healthcare access among different religious communities can reflect broader socio-economic inequalities. Addressing these disparities requires culturally sensitive health interventions that respect religious identities while promoting the benefits of skilled care during childbirth, ensuring that all women, regardless of their religious affiliation, have access to safe delivery services.

Table 1: Distribution of respondents by religion

Religion	No		Yes		Total	
	Number	Percent	Number	Percent	Number	Percent
Hindu	197	83.2	420	84.5	617	84.1
Other religion	40	16.8	77	15.5	117	15.9
Total	**237**	**100.0**	**497**	**100.0**	**734**	**100.0**

Source: Nepal Demographic and Health Survey, 2022

Table 1 shows that religion in relation to skilled birth attendance (SBA) utilization ('Yes' or 'No'). The data shows that Hindus, who form 84.1 percent of the total respondents, have a slightly higher proportion utilizing SBA (84.5%) compared to other religions (15.5%). This indicates a predominant religious influence on SBA usage, suggesting that Hindus might have better access to or more favorable attitudes towards modern healthcare services compared to other religious groups. However, the small difference between the groups could also suggest that while religion plays a role, other socioeconomic or cultural factors may also significantly influence SBA utilization.

Birth order: Birth order plays a critical role in determining the use of skilled birth attendance (SBA). Women having their third or subsequent children are significantly less likely to utilize SBA compared to those having their first or second child. This trend may reflect a sense of increased confidence or perceived lower risk by experienced mothers, leading to reduced formal healthcare engagement. Addressing this issue is essential, as every childbirth presents risks, making the presence of skilled attendants crucial for ensuring maternal and neonatal safety.

Table 2: Distribution of respondents by birth order

Birth order	No		Yes		Total	
	Number	Percent	Number	Percent	Number	Percent
First	39	16.5	182	36.7	221	30.2
Second	66	27.8	177	35.6	243	33.1
third or higher	132	55.7	137	27.7	270	36.7
Total	**237**	**100.0**	**497**	**100.0**	**734**	**100.0**

Source: Nepal Demographic and Health Survey, 2022

Table 2 shows that birth order and their utilization of skilled birth attendance (SBA) in the table reveals significant trends. First-time mothers show the highest proportion of SBA usage (36.7%), suggesting a higher perceived or actual need for professional assistance during their initial childbirth experience. In contrast, as birth order increases, there is a notable decline in SBA utilization, with only 27.7 percent of mothers in their third or subsequent pregnancies opting for skilled attendance. This steep drop, from 36.7 percent for first births to 27.7 percent for third or higher order births, likely reflects growing confidence or perceived competence in childbirth among more experienced mothers. However, this trend might also indicate complacency or resource constraints impacting continued access to skilled care.

Caste/ Ethnicity: Caste and ethnicity are significant determinants of skilled birth attendance (SBA), revealing deep-seated inequalities within healthcare systems. Members of marginalized caste or ethnic groups often face barriers that limit their access to skilled care during childbirth. These barriers can include discrimination, geographical isolation, economic constraints, and lack of information. The higher-caste groups like Brahmins and Chhetri's might have better access to SBA services compared to marginalized ethnic minorities. Efforts to improve SBA utilization must therefore prioritize inclusivity, ensuring that all ethnic and caste groups have equitable access to essential maternal health services.

Table 3: Distribution of respondents by cate/ethnicity

Ethnicity	No		Yes		Total	
	Number	Percent	Number	Percent	Number	Percent
Dalit	70	29.6	79	15.9	149	20.3
Muslim	41	17.1	75	15.0	115	15.7
Janjati	14	5.7	32	6.5	46	6.3
Other Terai	112	47.3	277	55.8	389	53.0
Brahmin/Chhetri	1	0.3	32	6.5	33	4.5
Total	**237**	**100.0**	**497**	**100.0**	**734**	**100.0**

Source: Nepal Demographic and Health Survey, 2022

Table 3 shows that significant disparities in skilled birth attendance (SBA) utilization across different groups. The "Other Terai" category shows the highest utilization (55.8%), suggesting better access or acceptance of healthcare services within this group. Conversely, the Brahmin/Chhetri group, despite generally being considered socioeconomically advantaged, reports unexpectedly low SBA use (6.5%), which might reflect cultural preferences or underreporting. The Dalits and Muslims also show lower SBA utilization, possibly due to systemic barriers or socioeconomic disadvantages. The Janjati group, with minimal representation in the dataset, indicates a need for targeted interventions to improve healthcare access.

Educational attainment: Educational attainment is a crucial predictor of skilled birth attendance (SBA). Women with higher levels of education are more likely to utilize skilled care during childbirth. Education empowers women

with knowledge about the benefits of professional healthcare services and equips them with the confidence to seek such services.
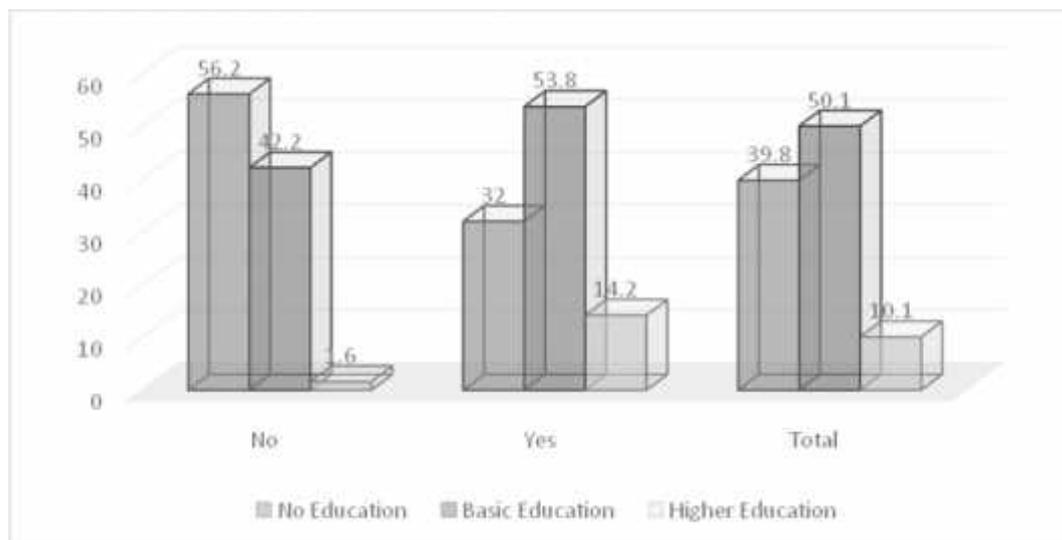

Figure 2: Distribution of respondents by educational attainment
Source: Nepal Demographic and Health Survey, 2022

Figure 2 shows that educational attainment reveals a significant correlation with the utilization of skilled birth attendance (SBA). Women with no education show the lowest SBA usage (32%), underscoring the impact of educational barriers on health service access. In contrast, those with basic education have a higher rate of SBA use (53.8%), suggesting that even basic literacy and education can substantially improve health service utilization. Remarkably, women with higher education show the highest percentage of SBA use (14.2% of the higher education group, representing a substantial proportion relative to their small number in the population).

Place of residence: Place of residence significantly impacts the likelihood of utilizing skilled birth attendance (SBA). Women living in rural areas often face greater challenges in accessing SBA services compared to their urban counterparts. These challenges include longer distances to healthcare facilities, poorer transportation options, and fewer healthcare resources, such as fewer clinics and trained professionals. Consequently, rural women may rely more on traditional birth attendants than skilled professionals, potentially increasing the risk of complications during childbirth.

Table 4: Distribution of respondents by Place of residence

Place of residence	No		Yes		Total	
	Number	Percent	Number	Percent	Number	Percent
Urban	177	74.5	376	75.7	553	75.3
Rural	60	25.5	121	24.3	181	24.7
Total	**237**	**100.0**	**497**	**100.0**	**734**	**100.0**

Source: Nepal Demographic and Health Survey, 2022

Table 4 shows that the distribution of skilled birth attendance (SBA) utilization based on place of residence. A larger proportion of respondents from urban areas (75.7%) reported using SBA compared to rural residents (24.3%). The overall distribution shows that urban respondents constitute 75.3 percent of the total population, indicating a higher concentration of the sample in urban areas. This urban bias in SBA utilization can be attributed to better access to healthcare facilities, more awareness, and possibly higher socioeconomic status compared to rural areas.

Wealthindex: The wealth index is a significant determinant of skilled birth attendance (SBA), illustrating how economic status influences healthcare access. Wealthier women have a markedly higher likelihood of utilizing SBA services, reflecting their greater ability to afford quality healthcare, travel to better-equipped facilities, and access critical information about maternal health services. In contrast, women from poorer households often face financial barriers that restrict their access to skilled care, increasing the risk of adverse birth results. Addressing these economic disparities is crucial for promoting equitable access to SBA. Policies that provide financial support, such as subsidized healthcare and conditional cash transfers for pregnant women, can help bridge this gap, ensuring that women of all economic backgrounds receive the skilled care they need during childbirth.

Table 5: Distribution of respondents bywealth Index

Wealth	No		Yes		Total	
	Number	**Percent**	**Number**	**Percent**	**Number**	**Percent**
Poorest	51	21.6	36	7.3	87	11.9
Poorer	88	37.0	121	24.5	209	28.5
Middle	61	25.9	141	28.3	202	27.5
Richer	31	13.1	123	24.8	154	21.0
Richest	6	2.5	75	15.1	81	11.1
Total	**237**	**100.0**	**497**	**100.0**	**734**	**100.0**

Source: Nepal Demographic and Health Survey, 2022

Table 5 reveals that wealth index and skilled birth attendance (SBA) utilization demonstrates a clear socioeconomic gradient. Those in the poorest wealth quintile have the lowest SBA utilization (7.3%), suggesting significant financial barriers to accessing healthcare services. As wealth increases, so does the utilization of SBA, with the richest quintile showing a 15.1 percent utilization rate, more than double that of the poorest. This pattern is evident across the spectrum, with each successive wealth quintile reporting higher percentages of SBA use. The richest groups, despite making up a smaller percentage of the total (11.1%), have much higher access to SBA, highlighting the impact of economic status on healthcare access.

Regression analysis for SBA assisted delivery: The logistic regression analysis offers a comprehensive overview of the model's performance in predicting SBA-assisted deliveries, backed by key statistical measures. The mean of the dependent variable at 0.673 indicates that a substantial proportion of the sample experienced. With a standard deviation of 0.469, the variable exhibits moderate variability, fitting the profile of a binary variable. The pseudo R-squared value of 0.156, though modest, suggests the model captures some, but not all, of the variability shows the result. This is further underscored by the significant chi-square value of 117.445, confirming that the model performs better than one without predictors. With 594 observations, the model is robustly supported by data. However, the Akaike and Bayesian Information Criteria, 673.067 and 760.805 respectively, suggest that while the model is statistically adequate, its predictive efficiency might be enhanced by refining its complexity or incorporating more explanatory variables. These insights collectively highlight the model's utility and areas for potential enhancement to better understand factors influencing SBA-assisted deliveries.

Table 6: Regression analysis for SBA assisted delivery

Variable	Odds ratio	Std. Err.	t	P>|t|	[95% Conf. Interval]		Sig
Age							
20-24	1.193	.413	0.51	.609	.606	2.351	
25-29	2.272	.955	1.95	.051	.997	5.18	*
30-49	3.111	1.553	2.27	.023	1.17	8.276	**
Birth order							
Second	.433	.121	-2.99	.003	.251	.749	***
Third or higher	.15	.05	-5.70	0	.078	.288	***
Religion							
Other religion	2.02	2.494	0.57	.569	.18	22.705	2.02
Caste/Ethnicity							
Muslim	.542	.68	-0.49	.625	.046	6.335	.542
Janjati	.843	.374	-0.39	.7	.353	2.01	.843
Other Terai	1.394	.356	1.30	.193	.845	2.301	1.394
Brahmin/Chhetri	5.375	5.894	1.53	.125	.627	46.108	5.375
Educational attainment							
Basic Education	1.367	.3	1.42	.155	.889	2.102	
Higher Education	3.983	2.606	2.11	.035	1.105	14.359	**
Place of residence							
Rural	1.013	.217	0.06	.952	.665	1.542	
Wealth index							
Poorer	1.579	.546	1.32	.186	.802	3.112	
Middle	2.159	.793	2.10	.036	1.051	4.436	**
Richer	2.743	1.116	2.48	.013	1.236	6.088	**
Richest	5.755	3.453	2.92	.004	1.776	18.653	***
Cons	1.2	.532	0.41	.681	.503	2.862	

*** $p<.01$, ** $p<.05$, * $p<.1$

Table 6 shows that a logistic regression analysis examining the likelihood of skilled birth attendant (SBA)-assisted delivery among women in a specific population, with the results displayed in terms of odds ratios and corresponding statistical metrics. The independent variables include age, birth order, religion, caste/ethnicity, educational

attainment, place of residence, and wealth index. Women aged 30-49 are significantly more likely to have an SBA-assisted delivery compared to the reference group (odds ratio [OR] = 3.111, p = .023), indicating that age is a significant predictor of utilizing skilled birth assistance. Women having their third or higher order birth show a substantially lower likelihood of SBA-assisted delivery (OR = .15, p < .001), suggesting that higher birth order is inversely related to the presence of skilled birth attendants. These variables were not statistically significant predictors, with wide confidence intervals indicating a high degree of uncertainty in the estimates. However, among caste/ethnicity groups, Brahmin/Chhetri women showed a non-significant trend toward higher odds of SBA-assisted delivery (OR = 5.375, p = .125).Higher education is associated with a significantly greater likelihood of having an SBA-assisted delivery (OR = 3.983, p = .035), underscoring the importance of education in health service utilization. Rural residency did not significantly affect the odds of SBA assistance, suggesting similar access or utilization patterns across rural and urban settings. Wealthier groups consistently showed higher odds of SBA-assisted delivery, with the richest group having the highest odds (OR = 5.755, p = .004), highlighting socioeconomic status as a crucial factor in access to skilled birth care.

The analysis demonstrates a clear pattern where socio-demographic factors such as age, birth order, education, and wealth index play significant roles in determining the likelihood of SBA-assisted delivery, with wealth and education emerging as particularly strong predictors. This information could guide interventions aimed at increasing the utilization of skilled birth attendants among underprivileged groups.

Discussion: The findings underscore the importance of age, birth order, educational attainment, and socioeconomic status as determinants of SBA usage, reflecting broader health disparities and access issues within the community. Age is a prominent predictor, with the odds of SBA assistance increasing significantly as women age, particularly among those aged 30-49 (OR = 3.111, p = .023). This trend may be attributed to older women's greater health awareness, increased pregnancy risk perception, or more resources to access skilled care. This aligns with research by Smith et al. (2018), which found that older maternal age is often associated with higher health service utilization due to increased obstetric risk awareness. Interestingly, higher birth order significantly decreases the likelihood of SBA use (OR = .15 for third or higher order births, p < .001). This suggests a possible complacency or perceived expertise in childbirth processes among women with multiple children, a phenomenon noted by Johnson et al. (2019), who argue that repeated pregnancy experiences can lead to a false sense of security about childbirth risks. Educational attainment emerges as a crucial determinant, with higher education associated with greater use of skilled birth care (OR = 3.983 for higher education, p = .035). Education likely equips women with better health knowledge, enabling them to make informed decisions regarding maternal health services. This finding is supported by Lee and Lim (2020), who demonstrate that educated women are more likely to recognize the benefits of professional birth assistance and seek it out accordingly. Wealth index is another strong predictor, with wealthier women more likely to access SBA services. The richest women have the highest odds of SBA utilization (OR = 5.755, p = .004), highlighting significant economic barriers to accessing healthcare. This is consistent with the studies by Gupta and Chen (2021), which emphasize that financial constraints remain one of the most formidable barriers to healthcare access, making wealth a critical factor in health service utilization. The role of caste/ethnicity and religion, though less pronounced, still reflects underlying social dynamics that influence SBA use. The non-significant trend observed among Brahmin/Chhetri women (OR = 5.375, p = .125) suggests potential cultural or systemic advantages that facilitate access to healthcare. Similarly, variable impacts by religious affiliation hint at the complex interplay between cultural beliefs and healthcare practices, which can either hinder or facilitate the utilization of SBA, as discussed by Martinez et al. (2022). The analysis also touches on the non-significant effect of rural residency on SBA usage, which may indicate improvements in rural health infrastructure or outreach programs that mitigate traditional urban-rural disparities in healthcare access. However, as highlighted by Singh and Kaur (2019), persistent challenges in rural healthcare delivery could still obscure these gains, necessitating continuous efforts to enhance rural health services.

This study shows that a pattern where socio-demographic factors such as age, birth order, education, and wealth index significantly shape the likelihood of SBA-assisted delivery. These findings should guide public health interventions aimed at increasing the utilization of skilled birth attendants, particularly among underprivileged groups. Modifying health policies to address these specific demographic and socioeconomic factors could substantially improve maternal health.

Conclusion

This analysis on SBA-assisted delivery suggests that age, educational attainment, and wealth index are significant predictors of utilizing skilled birth assistance. Specifically, older women (30-49 years) and those with higher education are more likely to have SBA-assisted deliveries. Wealthier women, particularly those in the richest category, also show significantly higher odds of such assistance. In contrast, women with higher birth orders are less likely to receive skilled birth care. These findings highlight the importance of socioeconomic factors in accessing skilled birth care and could inform targeted health interventions to improve maternal care services for underprivileged groups.

References

Ayele, G. Z., Melku, A. T., Belda, S. S., & Wassie, M. M. (2019). Utilization of institutional delivery care and associated factors among mothers in rural Ethiopia: A cross-sectional study. *BMC Pregnancy and Childbirth*, *19*(1), 1-9. https://doi.org/10.1186/s12884-019-2226-0

Bhandari, T. R., & Dangal, G. (2020). An analysis of factors influencing skilled birth attendance in Nepal. *Journal of Health, Population, and Nutrition, 38*(1), 11. https://doi.org/10.1186/s41043-020-0019-4

Bohren, M. A., Hunter, E. C., Munthe-Kaas, H. M., Souza, J. P., Vogel, J. P., & Gülmezoglu, A. M. (2020). Facilitators and barriers to facility-based delivery in low- and middle-income countries: A qualitative evidence synthesis. *Reproductive Health*, *11*(1), 1-17. https://doi.org/10.1186/1742-4755-11-71

Chowdhury, F., Rahman, M., & Akter, S. (2019). Factors associated with the utilization of skilled birth attendants in Bangladesh: An analysis of the Bangladesh Demographic and Health Survey 2014. *PLOS ONE*, *14*(6), e0218245. https://doi.org/10.1371/journal.pone.0218245

Fapohunda, B. M., & Orobaton, N. G. (2019). When women deliver with no one present in Nigeria: Who, what, where and so what? *PLoS ONE*, *8*(7), e69569. https://doi.org/10.1371/journal.pone.0069569

Fotso, J. C., Ezeh, A. C., & Essendi, H. (2009). Maternal health in resource-poor urban settings: How does women's autonomy influence the utilization of obstetric care services? *Reproductive Health*, *6*(1), 9. https://doi.org/10.1186/1742-4755-6-9

Gautam, S., & Adhikari, R. K. (2019). Impact of social determinants on maternal health in Nepal: A qualitative study. *Journal of Community Health Management, 6*(2), 70-75.

Gupta, S., & Chen, H. (2021). Economic barriers to healthcare access in developing nations. *Journal of Global Health Economics*, 5(2), 44-58.

Johnson, S., et al. (2019). Birth order and maternal health: Evidence from a developing country. *Journal of Maternal Health*, 12(3), 233-245.

Kabakyenga, J. K., Östergren, P. O., Turyakira, E., & Pettersson, K. O. (2017). Knowledge of obstetric danger signs and birth preparedness practices among women in rural Uganda. *Reproductive Health*, *8*(1), 33. https://doi.org/10.1186/1742-4755-8-33

Karkee, R., Lee, A. H., & Pokharel, P. K. (2018). Women's perception of quality of maternity services: A longitudinal survey in Nepal. *BMC Pregnancy and Childbirth*, *14*(1), 45. https://doi.org/10.1186/1471-2393-14-45

Kumar, P., & Singh, S. (2021). Effects of federal restructuring on health care access in Nepal. *Nepal Medical Journal, 3*(1), 45-52.

Lee, J., & Lim, N. (2020). The impact of education on maternal health care utilization: Evidence from West Africa. *International Journal of Environmental Research and Public Health*, 17(7), 2589.

Martinez, B. et al. (2022). Religion and reproductive health services: A cross-sectional study. *Public Health Journal*, 18(1), 159-170.

Ministry of Health and Population (MoHP) [Nepal]. (2023). *Nepal Demographic and Health Survey 2023*. https://dhsprogram.com/pubs/pdf/FR336/FR336.pdf

Ministry of Health and Population (MoHP). (2020). Nepal Health Sector Strategy 2020-2025. Kathmandu:

Pathak, P., & Malla, S. (2020). Gender and health care: The impact of gender on the health-seeking behaviors of rural women in Nepal. *Rural and Remote Health Journal, 20*(3), 3054.

Pradhan, A., Sharma, S. K., & Niraula, S. R. (2019). Utilization of maternal health services in Nepal: Analysis from Nepal Demographic and Health Survey 2016. *Nepal Journal of Epidemiology, 9*(1), 740-749. https://doi.org/10.3126/nje.v9i1.23019

Rai, A. K., & Singh, G. (2019). Caste and maternal health care service use among rural Hindu women in Maithili, Nepal. *Journal of Obstetrics and Gynaecology Canada, 41*(12), 1689-1696.

Shrestha, B., Paneru, D. P., & Shrestha, S. (2018). Urban-rural differences in the use of maternal healthcare services in Nepal. *Journal of Urban Health, 95*(4), 547-558. https://doi.org/10.1007/s11524-018-0277-3

Singh, A., & Basnet, P. (2022). Exploring intersectionality in healthcare: A case study on maternal health in rural Nepal. *Global Health Action, 15*(1), 1928374. https://doi.org/10.1080/16549716.2021.1928374

Singh, A., Pallikadavath, S., Ogollah, R., & Stones, W. (2014). Maternal tetanus toxoid vaccination and neonatal mortality in rural North India. *PLOS ONE*, *9*(1), e68891. https://doi.org/10.1371/journal.pone.0068891

Singh, G., & Kaur, M. (2019). Rural-urban disparities in maternal health care utilization: A study of two Indian states. *Indian Journal of Public Health Research & Development*, 10(11), 117-123.

Smith, G., et al. (2018). Age-related patterns in health service utilization and associated costs. *Journal of Health Economics*, 39, 1-10.

Thapa, R., & Sharma, H. (2023). Evaluating health policy interventions for skilled birth attendance in Nepal. *Health Policy and Planning, 38*(1), 102-113.

Titaley, C. R., Hunter, C. L., Dibley, M. J., & Heywood, P. (2010). Why do some women still prefer traditional birth attendants and home delivery? A qualitative study on delivery care services in West Java Province, Indonesia. *BMC Pregnancy and Childbirth*, *10*(1), 43. https://doi.org/10.1186/1471-2393-10-43

The Socio-demographic Dimension of the Informal Labour Force in Urban Nepal

Dipak Bahadur Adhikari, Ph.D.
Lecturer, Central Department of Economics, T.U.
Email: dbadhikari10@gmail.com
https://orcid.org/0000-0002-6464-2737

Pramshu Nepal, Ph.D.
Associate Professor, Central Department of Economics, T.U.
Email: pramshunepal@gmail.com (*Corresponding author*)
https://orcid.org/0009-0009-7116-636X

Abstract

The objective of this study is to analyze the socio-demographic characteristics of the labour force, and features of the urban informal economy, with a focus on Nepal. Specifically, it seeks to pinpoint the primary economic endeavors and the ways in which they serve as a constructive financial engine and employment generation for household livelihood. In order to achieve this, the researcher conducted a primary survey through a structured questionnaire. Descriptive statistics, chi-square, percentages, and different forms of graphs were used in the investigation. The analysis of the sampled respondents revealed that informal work is a dominant occupation, with about two-thirds of household heads engaged in this sector. Among the respondents, job in the informal sector was the first-hand job for about 75 percent. Over one-third of the respondents have worked for five years or less in a particular informal business and service sector. The findings show that many people have been involved in the informal sector after Nepal's great earthquake of 2015. About two-thirds of the respondents are migrants, whereas 62 percent migrated from their own country and 9 percent emigrated from India.

Keywords:

Informal activities, Demographic, Labour force, Qualitative methods, Urban

Introduction

Total number of informal jobs, whether carried out in informal sector(IS) enterprises, formal sector enterprises, or households; counting workers holding informal works and own-account workers engaged in their own IS firm; members of casual producers' organizations; contributing family labors in own-account involved in the production of goods for their end used by their family; and formal or informal sector enterprises refers to informal Labour force (17th ICLS, 2003).

The informal labour force is generally linked with deprived, unproductive, and vetoed labourers, and its import has diverse in various economic eras (Gerxhani, 2004). Usually, informal activities are defined as those working outside government and labour rules (Teltscher, 1994). Most of the informal labourers: wage workers, and one-account workers in this sector, are deprived and unable to secure their work, welfare, social security and expression with representation (Chen et al., 2004). The category of economic endeavors that are not governed by official oversight is known as the informal economy (IE) (Hart, 2008). People are involved in the informal activities for various reasons; social obligation and primary income are significant. For the poor and disenfranchised, the informal economy provides their primary source of income (Sharma & Adhikari, 2020). Losby et al. (2002) have stated that the IE is a portion of the social economy that comprises inter and intra-family labour exchange. This work was provoked by economic gain as well as a social obligation.

An individual's employment in the informal sector can be strongly predicted by their socio-demographic features (Basbay et al., 2018). There is a negative correlation between age and education level and the amount of time spent in informal economic activities (Williams et al., 2016). The article of Adhikari (2020) also supports that the early working age population is involved in the informal sector. Additional research revealed that those in white-collar jobs

with high incomes are less likely to participate in grey economic activity (McCaig & Pavcnik, 2015). Jensen et al., (2019) showed regional differences in the kind and character of informal economic activity, as well as an urban-rural gap.

This paper attempts to verify the importance of informal economy by providing socio-demographic characteristics of informal workers of main urban area of Nepal. Three main indicators economic, social and behavioral are explained to justify the socio-demographic dimension of the informal labour force. The second section deals with the literature review. The third section deals with methodology. The fourth section discusses the socio-demographic status of respondents, household characteristics, perceptions, and problems of respondents.

Literature Review

Both official and informal economic activity contribute to forming a nation's economy. The IE has received little attention from international agencies, which have instead focused exclusively on promoting urban areas' role in this evolution due to their ability to improve living conditions, create jobs, and renovate within smaller ecological footprints than other settlement patterns (Browm & McGramahan, 2016). The informal sector has employed roughly 1.6 billion people, just a sizable number (Neuwirth, 2011; Ruzek, 2014). In a World Bank report, Benjamin et al. (2014) examined those nations whose means of support and employment for a severe population portion were dependent on IS. Informality is associated with low productivity across the regions. This sector is shown to have a high share of about 70 percent of low-income countries in Africa and a minor share of high-income countries. This is supported by Schneider and Endte (2003); in developing countries, the IS represents 10 to 20 percent of global production and over a third of the global output of developing countries.

Sookram et al. (2009) studied the socio-demographic characteristics in the informal sector of an evolving economy using the case of Trinidad and Tobago. The researchers found that household members are motivated to choose the informal sector due to the high tax rate in formal economic activities. The respondents were also motivated in this sector by socio-economic conditions, such as the number of family members they must back and trust that the resulting tax evasion will go unnoticed. Their understanding of the risk of detection by the tax authority is primarily determined by the income they earn in the IS and the extent of government administration.

Hossain et al. (2015) tried to explain the socio-economic analysis of informal economic activities, stating that most of the workers were young and middle-aged. Over half of workers went to high school, and around half completed secondary education. As workers have financial constraints, the credit facility is usually limited to informal businesses. Sixty percent of workers own businesses and save, and around 15 percent borrow from relatives.The low income of the respondents indicates the low economic status in society. In this regard, none of them wants to pay government tax.

Williams and Horodnic (2015) designed their study to identify the condition of self-employment and the informal economy, taking some evidence from the European Union. They tried to answer whether those self-employed in the IS are marginalized based on 27,563 direct interviews conducted, and about 1,969 individuals reported themselves as self-employed. To ensure that the variables were related to sex, age, region, and locality size, the researcher used a multi-stage random sampling.Their analysis revealed that for younger, self-employed, widowed shop owners, craftspeople, and individuals, their morality does not align with national morality. They are likely to engage in the informal economy significantly. Men engage in the IE significantly more than women as they live in the affluent EU region. The policy recommendations of this study were: informal self-employment helps the marginalized people, so the region's government should give attention to protecting them; this is also the case for individual nations and other regions as well, and it needs to be evaluated. Diallo et al. (2021) have analyzed the socio-economic impacts of the informal sector in Guinea. This study aimed to identify the core economic activity and how these generate positive financial power for local development. The study revealed that the IS deals with major prospects for sustainable development and poverty alleviation if the necessary infrastructures and support are provided. Regular monitoring and evaluation systems are required for the development of this sector. The role of socio-economic causes such as credit and educational status, compared to those in the government policies and formal sector, etc., need to be paid more devotion. At the environmental level, progress is constrained by weak infrastructures in communication and transportation, which restrict the extension of enterprises that may be proved locally profitable.

Methodology

This part describes the research approach and methodology used to produce the data required to address the study concerns after providing the contextual framework and examining pertinent literature in the preceding two sections.

The purpose of this study is to investigate the state of informal activity in urban areas of Nepal. The purpose of the study is to investigate the core representative status first because no previous study or database exists. In these regards, a structured survey questionnaire used in a qualitative manner may prove to be more successful.

The results of this study can be applied to decision-making concerning the socioeconomic facets of informal work. A representative survey of informal workers in the urban Nepal is therefore necessary for this study. In this regard, a survey that relied on the researcher' subjective judgment non-probability sampling technique was conducted.

In total 423 informal workers in six metropolitan city of Nepal provided primary data for the survey using a structured questionnaire. Since the population's total cannot be calculated or is unpredictable in nature, a sample size of 423 is thought to be representative in this unknown population case. The study is carried out between the months of first of the July andend of the December in 2020. A variety of descriptive data have been employed to portray the socio-economic status of informally employed individuals.

For analysis of the results, the STATA-14 program was used to show the statistical relationship between the variables. The chi-square test has been used to examine the difference between the variables on employment patterns and characteristics of informal activities under some classifications. Some simple tabular form in percentage basis technique and graph have been used to describe the relationship between related variables like distribution of occupation by sex, use of durable goods and saving patterns of respondents.

Data Analysis and Results

This paper mainly focuses on the socio-economic characteristics of the sampled labour force in all six metropolitan cities of Nepal. It also considers the nature of the economic activities of the labour force involved in the informal sector of the sampled metropolitan cities. These cities are more appropriate places for non-agricultural informal work.

Many studies have been conducted on the informal sector economy, and most have centered on labor issues focusing on the workers' point of view. The paper consists of a descriptive analysis of socio-economic variables.

Socio-Demographic Characteristics of Respondents

Under socio-demographic characteristics, this study covers the household socio-demography status related to migration, the origin of informal work, age, education, family size, sex, marital status, ethnicity, and occupational status of respondents.

Origin of Respondents (Migration Status)

For socio-economic security, people leave the area where economic opportunities are less and come to the place where they feel economically comfortable. So, migration is expected in the Nepalese context. Rural to urban movement is a critical issue confronted by almost all the municipalities of Nepal (GoN, 2008).
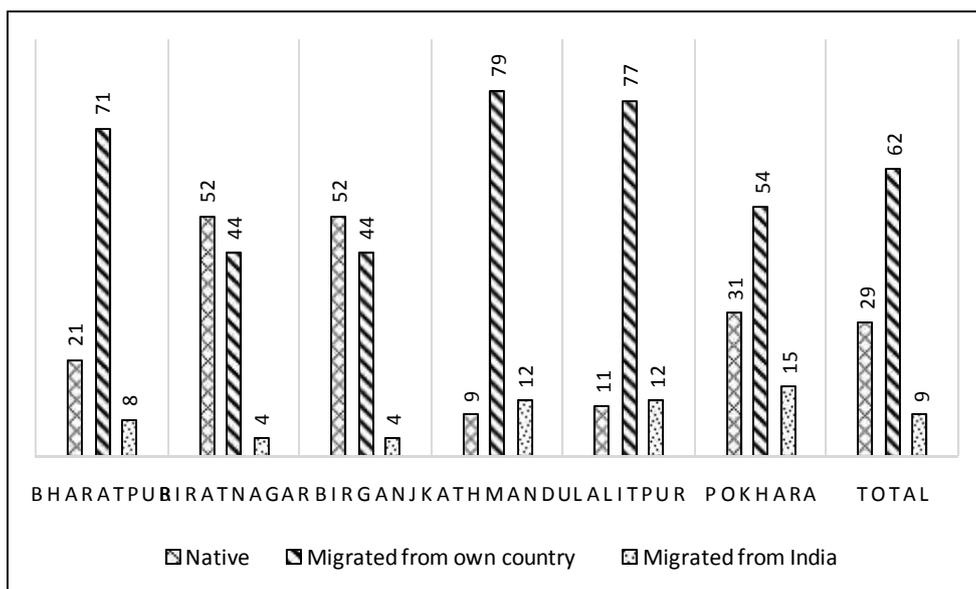

Figure 1: Origin of Respondents
Source: Field Survey, 2020

As represented in figure 1, among the total respondents, 71 percent are migrants, whereas 62 percent migrated from their own country and 9 percent from India. The numbers of migrated informal workers are higher in Kathmandu, Lalitpur and Bharatpur compared to the other three metropolitan cities. The view of Harris and Todaro (1970) supports this result that, generally, the informal sector complements migration. The migration of household heads is strongly associated with informal business creation in the dynamic area (Sheehan & Riosmena, 2013).

Origin of Informal Work

The origin of the informal sector refers to the occupations they were involved in before getting involved in current informal workers. The informal sector job is the first-hand job for many respondents (74 percent), as represented in figure 2. It is the effect of migration from rural to urban areas. In a new place, migrants have difficulty finding employment in the formal sector, so the informal sector becomes a staging ground for those trying to get formal sector jobs (Abdulloev et al., 2012). About 21 percent of respondents are from the agriculture sector. People transform agriculture into the informal sector because of low productivity in the agriculture sector. Only 5 percent of respondents have entered the informal sector, leaving the formal sector.
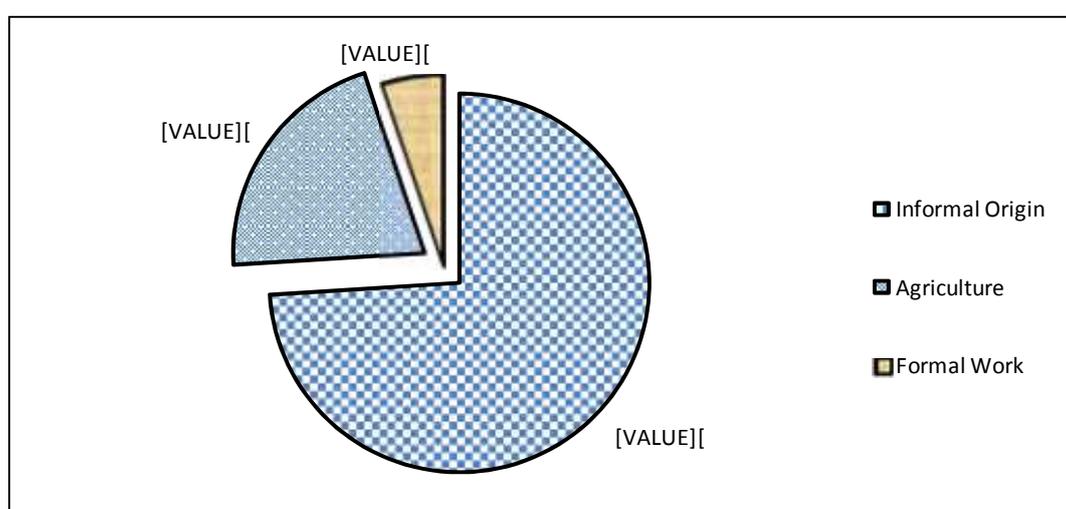

Figure 2: Origin of Informal Work
Source: Field Survey, 2020

Age, Education, and Family Size

The informal workers have been analyzed based on the respondent's age, education and family size.

Table 1: Distribution of Age, Education and HH Size of Respondents

Variables	Mean	Std. Deviation	Min	Max	Std. Error
Age	35.87	12.21	12	71	0.59
Education	5.62	4.51	0	18	0.22
HH size	4.65	1.88	1	16	0.09

Source: Field Survey, 2020

In this table, the age statistics of respondents in the study, the mean age of respondents is 35.87 years with a considerable standard deviation of 12.21, covering low ages of 12 up to 72 among the respondents. The low standard deviation from the mean age is indicative of a consistently distributed sample.

For the education of the respondents, the average education level is only 5.62 years of schooling because a large percentage (54) of respondents in Birganj, compared to other metropolitan cities, were illiterate. The low level of education is the main reason behind the increase in the informal economy in urban Nepal. The average family size of the respondents is found to be 4.65, which is quite similar to the national level of 4.88 (CBS, 2012), which is the last census survey of Nepal. Among the six study sites, the average family size in Biratnagar is higher (5.48), and in Kathmandu is lower (4.28).

Age Group of Respondents

The age distribution of the respondents is represented in figure 3.
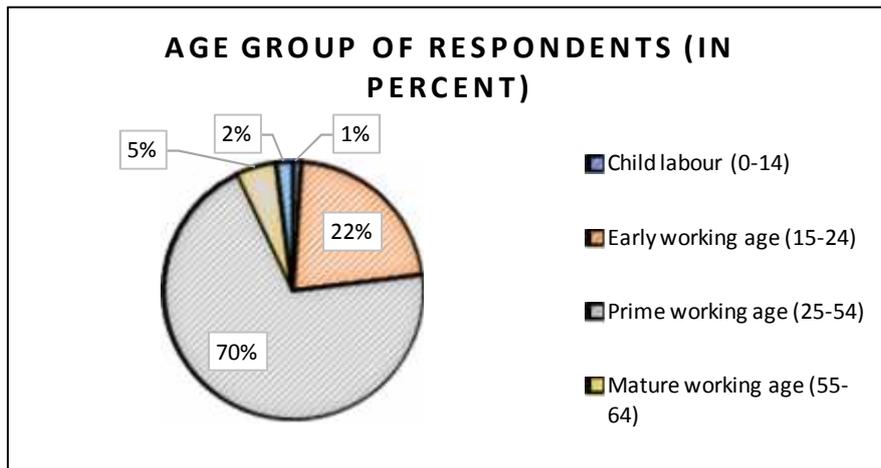
Figure 3: Age Group of Respondents
Source: Field Survey, 2020 -Based on Central Intelligence Agency (2020)

The most significant number of respondents, more than two-thirds, are from the prime working age group (25-54 years). Only a negligible percentage of respondents are involved in child labour and the elderly age group. It indicates that due to the lack of formal jobs, people of prime working age are involved massively in the informal sector.

Location-wise Educational Level of Respondents

The radar chart is used to analyze the different levels of education based on six metropolitan cities of Nepal (Figure 4).

Figure 4: Intensity of Education
Source: Field Survey, 2020

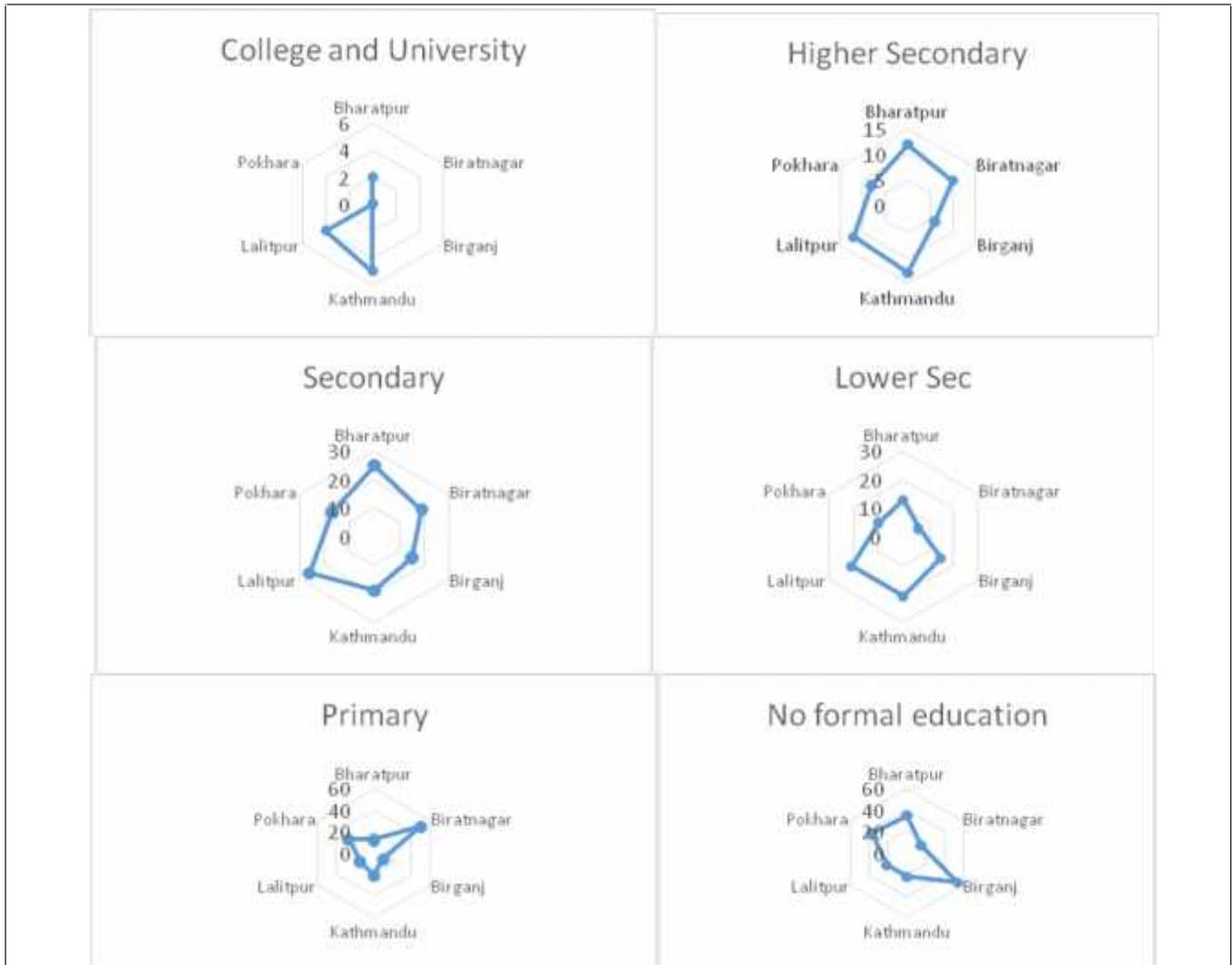A greater percentage of illiterate respondents are involved in Birganj Metropolitan City, whereas a smaller percentage in Biratnagar is in the informal sector than all other metropolitan cities. Similarly, a more significant percentage of respondents with primary education are engaged in Biratnagar Metropolitan City than in other study areas. The cities are similar in the case of lower secondary and secondary level education. However, in the case of higher education, a significant percentage of respondents are in Kathmandu, Lalitpur, and Bharatpur compared to other cities. No respondent works in the informal sector and has a university education in Pokhara, Biratnagar, and Birganj.

Gander, Marital Status, and Ethnic Groups

The sex, marital status, and ethnic group are shown in Table 2. It is clear that over two-thirds of respondents are male (69.50%) and married (75%). More than half (53.66%) of respondents are from the indigenous group. Negrón (2014) views ethnicity as a social categorization most prominent in heterogeneous societies. Ethnicity has been recognized to do with business startups and job success (Fafchamps & Minten, 2002). These statistical data suggest higher than average participation rates of Nepalese males, married and indigenous, in the informal economy.

Table 2: Sex, Marital Status, and Ethnic Groups

Sex	Freq.	%	Marital status	Freq.	%	Ethnic Group	Freq.	%
Male	294	69.5	Married	319	75.4	Dalit	61	14.4
Female	129	30.5	Not married	84	19.9	Indigenous group	227	53.7
Total	423	100	Widowed	15	3.5	Bramhan/Chhetri	135	31.9
			Separated	5	1.2	Total	423	100
			Total	423	100			

Source: Field Survey, 2020

Years of Experience

Years of experience are the knowledge gained from working in a particular field for a particular period. With the years of experience in the study, the mean years of experience are 10.23 with a standard deviation of 9.29, covering the least experience age of 1 year up to 50 years among the respondents. In comparison among the Metropolitan Cities, the mean age of experience and maximum age of experience were both higher in Birganj Metropolitan City and low in Bharatpur.

Table 3: Years of Work Experience

Metropolitan Cities	No.	mean	Std. Deviation	Min	Max
Bharatpur	48	8.79	8.32	1	30
Biratnagar	48	11.79	10.73	1	40
Birganj	48	12.88	11.33	1	50
Kathmandu	150	10.31	9.32	1	50
Lalitpur	81	8.59	9.90	1	32
Pokhara	48	10	8.07	1	30
Total	423	10.23	9.29	1	50

Source: Field Survey, 2020

Figure 5 displays information about the working age of the informal worker. It can be seen that more than one-third (41%) of the respondents are working for five years or less in a particular informal business and service. The last five years, as defined, is the period 2015 AD - 2020 AD, representing the year of the recent great earthquake's effect on Nepal's economy.

The figure shows that many people are involved in the informal sector after Nepal's great earthquake of 2015. One-fourth of respondents are working for 6 to 10 years, 12 percent have 11 to 15 years, and 11 percent have experienced 16 to 20 and 21 over. Adhikari et al. (2021) argued that those who work for a long time in the informal sector automatically leave work. It indicates that people are involved in the informal sector for their livelihood in the short run, and in the long run, they are not interested in such a sector.
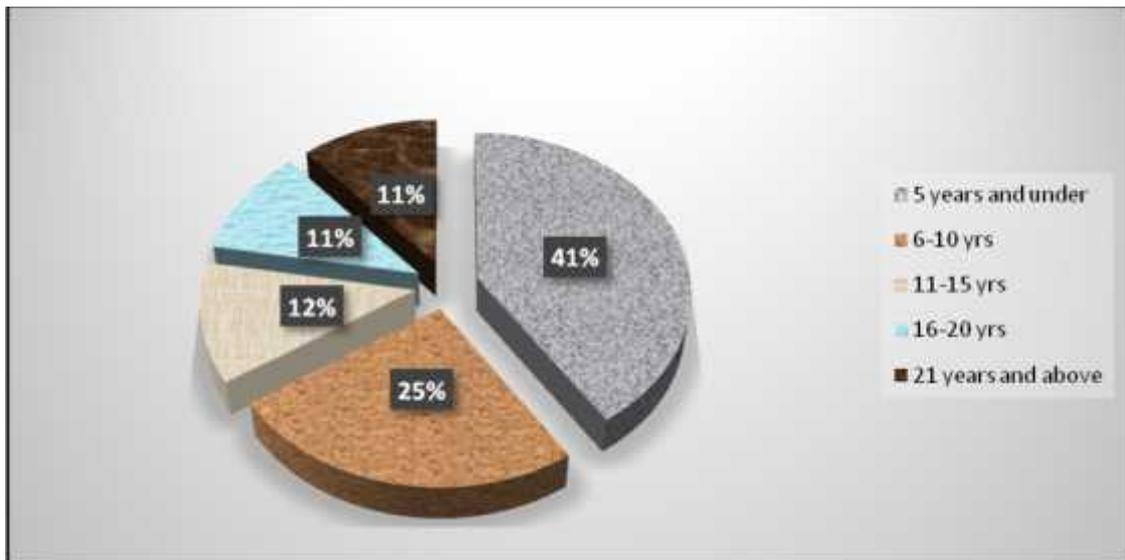
Figure 5: Years of Experience under different group
Source: Field Survey, 2020

Households Asset and Residence Status

Around 89.36 percent of total respondents reside in their own homes, whereas 10.64 percent in rented is quite similar to the national level of 90 percent (CBS, 2012) as in the last survey of Nepal.

The Metropolitan City-wise residence situation of the respondents is shown in figure 6. It is found that those who work in Lalitpur Metropolitan City have their own house in their permanent place. About 90 respondents have their own house, those who work in Kathmandu, Pokhara and Birganj, whereas, in the case of Bharatpur and Biratnagar, only around 70 percent of respondents have their own house. A tiny percentage of respondents do not own a house in the nation. In the given diagram, the indication yes stands for they have their own house; otherwise, no.
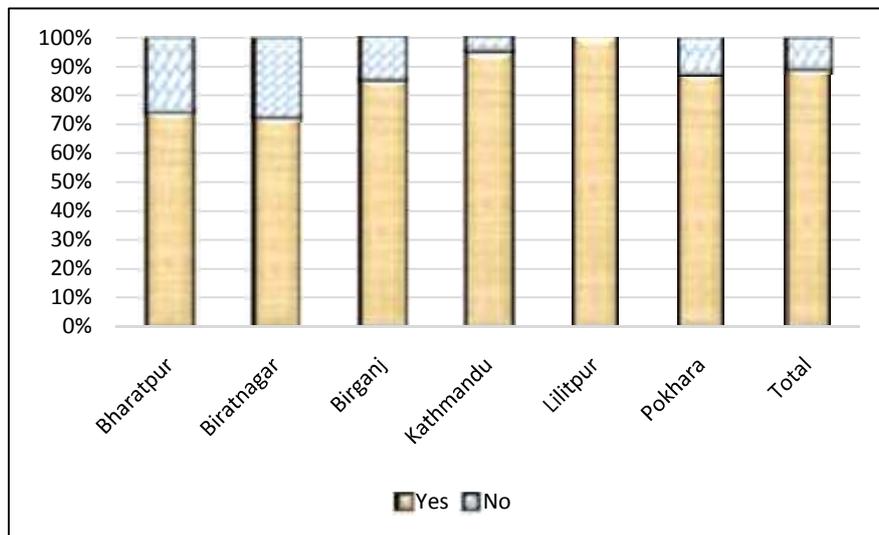
Figure 6: Household Residence Status
Source: Field Survey, 2020

The Relation of Use of Durable Consumer Goods and Saving

Durable goods are an essential tool for modern life. They are taken as an indicator of people's living standards. The use of more durable goods refers to high living standards and vice versa. About 92 percent of respondents have some level of durable goods, whereas only around 8 percent have no type of durable goods. This indicates that large numbers of informal workers can effortlessly fulfill their basic needs from informal work.

Table 4 shows that more household savings refer to more durable goods use than no savings. The value of ꭓ2 is significant at the 1 percent level 0.000 p-value for all levels. The goodness of fit in the model is less than 0.01.

Table 4: Use of Durable Goods and HH Saving

Use of Durable Goods	Household Savings		Total	2
	Yes	No		
Yes	255 (98)	134 (82)	389 (92)	
No	5 (2)	29 (18)	34 (8)	**34.1299*****
Total	260 (100)	163 (100)	423 (100)	

***0.01, ** 0.05, *0.1 level of significant; Figures within parentheses are percentages.

Savings Status

The saving statistics are shown in table 5. More than 60 percent of respondents have been able to save from their income. Among them, the average monthly saving is NRs.6081.54 with considerable standard deviation, covering most negligible savings of NRs.500 up to NRs.50000 among the respondents. The low standard deviation from the mean saving indicates a consistently distributed sample. The average value of respondents' available assets is more than 15 lakhs.

Table 5: Saving Statistics

Monthly Saving Statistics (in NRs)				
Obs	Mean	Std. Dev.	Min	Max
260	6081.54	6194.12	500	50000
Value of Available Assets Statistics				
Obs	Mean	Std. Dev.	Min	Max
423	1543487	3082329	0	25000000

Source: Field Survey, 2020

Perception and Problems Related to Informal Work

The respondents' perception is related to the tentative scenario of the informal sector in an urban area of Nepal. The perception of respondents on the focused issues of the study is given in Table 6. Around 95 percent of total respondents have reported that their involvement in this sector has increased their social integration. Around 90 percent of respondents feel satisfied with their current occupation in the informal sector. Almost all (97%) respondents think that their basic needs are met by informal work.

Interestingly, the highest percentage (70%) of respondents is not satisfied with the assistance given by government institutions. Moreover, more than three-forth percent of respondents feel different kinds of harassment in their informal business.

Social Participation and Network

Social and institutional involvement and participation are significant factors that help workers know details about the informal sector's activities and protect them from different hurdles created by other sectors. However, of the total respondents, almost all have not been members of social or professional associations.

Discussion

The informal economy is a significant component of labor markets worldwide, particularly in developing countries. Age significantly impacts informal economy involvement. Younger workers and prime working age seek flexibility due to lack of formal job opportunities, Chen (2007) emphasizes that because of their lack of training and work experience, people in this age range are particularly vulnerable to changes in the economy.

Younger individuals, often engage in informal work due to a lack of formal employment opportunities and the need for flexibility (Amin & Makhija, 2021).While older workers seek financial support from early retirement. This dual role highlights differing motivations. One important factor in the informal economy is gender. Due in large part to societal expectations and restricted access to formal career options, women are overrepresented in the workforce. Women frequently participate in informal work to balance family responsibilities Kabeer (2015).

Another important aspect affecting participation in the informal economy is educational achievement. People with lower levels of education are more likely to work informally because they are not qualified for formal occupations (Schneider & Enste, 2000).Individuals with lower levels of education tend to dominate informal employment due to a lack of qualifications for formal jobs (Charmes, 2022). Dynamics of informal work are strongly influenced by family size and marital status. Larger families may need several sources of income, which frequently results in all

members—including the children—looking for work (Edmonds, 2006). Because children may forsake their schooling in order to make financial contributions, this dependency on informal labor might prolong poverty cycles.

Experiences in the informal economy are significantly shaped by ethnicity. Minority ethnic groups frequently encounter obstacles to formal employment, which forces them to work in informal businesses (Portes & Haller, 2002). Support the evidence by Portes and Rumbaut (2019), marginalized ethnic groups frequently face obstacles to regular employment, which forces them to pursue informal work. Social networks facilitate job access, but ethnic discrimination can limit opportunities. Informal networks are crucial for marginalized communities, navigating the labor market (Massey et al., 1993).

Conclusion

The main objective of this paper is to analyze the dimensional analysis of the informal sector in the urban area of Nepal. Marginalized and impoverished people mostly rely on the informal economy for their livelihood. It is necessary to talk about the respondents' social demographics, including their sex, age, caste, education, marital status, and employment status, in order to comprehend the realities faced by informal workers.

The mean age of respondents is about 36 years with a considerable standard deviation, and the most significant number of respondents, more than two-thirds, are from the prime working age group (35-54 years). The working age of the informal workers is 41 percent of the respondents, who work for five years or less in a particular informal business and service. Similarly, over two-thirds of respondents are male and married. More than half of the respondents are from an indigenous group. As compared to males, more female respondents were self-employed. In total, 73 percent of female respondents are in this sector, but only 51 percent of male respondents are there. Informal work is the dominant occupation. About three-fourths of household heads are engaged in this sector. Agriculture and private job are primary for around one-fourth of household heads. The study found that around 95% of respondents reported that their involvement in this sector had increased their social integration. Around 90% of respondents feel satisfied with their current occupation in the informal sector. Almost all (97%) respondents think that their basic needs are met by informal work. About 77 percent of respondents feel harassed in their informal business—the incidence of harassment related to the informal business by metro police is the largest at about ninety percent. Social and institutional involvement and participation are significant factors, but almost all have not been members of social or professional associations.

References

Abdulloev, I., Gang, I. N., & Landon-Lane, J. (2012). *Migration as a substitute for informal activities: Evidence from Tajikistan*. Emerald Group Publishing Limited.

Adhikari, D. B. (2020). Factors influencing the income of urban informal workers: Evidence from Nepal. *Economic Journal of Development Issues*, *30*(1-2), 13-24.

Adhikari, D. B., Gupta, P. Devkota, N., Paudel, U. R., & Parajuli, S. (2021). Challenges in transformation of informal business sector towards formal business sector in Nepal: Evidence from descriptive cross-sectional study. *Asian Journal of Agricultural Extension, Economics & Sociology*, *39*(2), 95-106.

Amin, M., & Makhija, S. (2021). "Youth and the Informal Economy: An Exploratory Study." *International Labour Review*, 160(2), 341-365.

Ba bay, M. M., Elgin, C., & Torul, O. (2018). Socio-demographics, political attitudes and informal sector employment: A cross-country analysis. *Economic Systems*, *42*(4), 556-568.

Benjamin, N., Beegle, K., Recanatini, F., & Santini, M. (2014).*Informal economy and the World Bank*. Washington, DC: The World Bank.

Brown, D., & McGranahan, G. (2016).The urban informal economy, local inclusion and achieving a global green transformation. *Habitat International*, *53*, 97–105.

CBS, (2012).*National Population and Housing Census*. Kathmandu: Central Bureau of Statistics National Planning Commission, Secretariat Government of Nepal, November.

Charmes, J. (2022). "The Informal Economy: Definitions, Characteristics, and Statistics." *ILO Working Paper*.

Chen, M. A., Vanek, J., & Carr, M. (2004).*Mainstreaming informal employment and gender in poverty reduction: A handbook for policy-makers and other stakeholders*. Commonwealth secretariat.

Chen, M. A. (2007). *Rethinking the informal economy: linkages with the formal economy*. United Nations DESA Working Paper. New York: United Nations.

Diallo, A., Yin, Z., & Beckline, M. (2021).Assessing the socio-economic impacts of the informal sector in Guinea, West Africa. *Open Access Library Journal*, *4*(01), 1.

Edmonds, E. V. (2006). "Child Labor and Child Schooling in a Labor Surplus Economy: Evidence from Peru." *Journal of Development Economics*, *81*(2), 240-275.

Fafchamps, M., & Minten, B. (2002). Returns to social network capital among traders. *Oxford Economic Papers*, *54*(2), 173-206.

Gërxhani, K. (2004), Informal sector in developed and less developed countries: A Literature Survey. *Public Choice*, *120*(3), 267-300

Harris, J. R., & Todaro, M. P. (1970). Migration, unemployment and development: A two-sector analysis. *The American Economic Review*, *60*(1), 126–142.

Hart, K. (2008). *Between bureaucracy and the people: a political history of informality* (No. 2008: 27). DIIS Working paper.

Hossain, M. K., Siddique, P. J., & Islam, S. (2015). Socio-Economic Analysis of Informal Business Activities: A Case Study on Central Business District Area of Dhaka City.

ILO, (2003).*Seventeenth International Conference of Labour Statisticians (ICLS)*.International Labour Organization, 2003.

Jensen, L., Tickamyer, A. R., & Slack, T. (2019).Rural-urban variation in informal work activities in the United States. *Journal of Rural Studies*, *68*, 276-284.

Kabeer, N. (2015). *Gender, Labour Markets and Poverty: An Overview of the Issues*. International Labour Organization.

Losby, J. L., Else, J. F., Kingslow, M. E., Edgcomb, E. L., Malm, E. T., & Kao, V. (2002). Informal economy literature review. *ISED Consulting and Research*, *1*, 55.

Massey, D. S., Arango, J., Hugo, G., Kouaouci, A., & Pellegrino, A. (1993). "Theories of International Migration: A Review and Appraisal." *Population and Development Review*, 19(3), 431-466.

McCaig, B., &Pavcnik, N. (2015).Informal employment in a growing and globalizing low-income country. *American Economic Review*, *105*(5), 545-550. Williams, C. C., Shahid, M. S., & Martínez, A. (2016). Determinants of the level of informality of informal micro-enterprises: Some evidence from the city of Lahore, Pakistan. *World development*, *84*, 312-325.

Negrón, R. (2014). Diversity, Multiethnicity, and Latino social networks. *Societies*, *4*(2), 222–239.

Neuwirth, R. (2011). Global Bazaar-Today's street markets and shantytowns are forging the world's urban future. *Scientific American*, p. 56.

Portes, A., & Haller, W. J. (2002)."The Informal Economy."*The Sociology of Development Handbook*, 303-322.

Portes, A., & Rumbaut, R. (2019).*Immigration and Ethnic and Racial Inequality in the United States*. Russell Sage Foundation.

Ruzek, W. (2014).The informal economy as a catalyst for sustainability. *Sustainability, 7*(1), 23–34.

Schneider, F., & Enste, D. (2000). "Shadow Economies: Size, Causes, and Consequences." *Journal of Economic Literature*, 38(1), 77-114.

Sharma, B., & Adhikari, D. (2020). Informal Economy and Poverty Dynamics: A Review. *Quest Journal of Management and Social Sciences, 2*(1), 168-180.

Sheehan, C. M., & Riosmena, F. (2013).Migration, business formation, and the informal economy in urban Mexico. *Social science research*, *42*, 1092–1108.

Sookram, S., & Watson, P. K., & Schneider, F. (2009).Characteristics of households in the informal sector of an emerging economy.*Applied Economics, 41*(27), 3545-3559.

Teltscher, S. (1994). Small trade and the world economy: Informal vendors in Quito, Ecuador. *Economic Geography*, *70*(2), 167-187.

Williams, C. C., & Horodnic, I. A. (2015). Self-employment, the informal economy and the marginalisation thesis: some evidence from the European Union. *International Journal of Entrepreneurial Behavior & Research, 21*, 224-242.

Williams, C. C., Shahid, M. S., & Martínez, A. (2016). Determinants of the level of informality of informal micro-enterprises: Some evidence from the city of Lahore, Pakistan. *World development*, *84*, 312-325.

Forest Fire Zone Identification and Susceptibility Hazard Mapping of Gandaki Province, Nepal

Khagendra Raj Poudel
Lecturer, Tribhuvan University,
Department of Geography,
Prithvi Narayan Campus, Pokhara

Naresh Paudel
Associate Professor,
Tribhuvan University,
Department of Geography,
Prithvi Narayan Campus, Pokhara

Lal Bahadur Oli
Associate Professor, Tribhuvan University,
Central Department of Geography, Kirtipur
Email: krpoudel@pncampus.edu.np
(*Corresponding author*)

Abstract

Forest fires are the most frequent hazards in Gandaki Province, Nepal, and have deeply affected its unique physiography, vegetation, and human activities. This study focuses on identifying the main factors that cause forest fires and develops a susceptibility map using the MaxEnt model. Satellite image data and field observation across the province; topographical variables such as physiography, elevation, slope, and environmental variables such as temperature and precipitation, and anthropogenic variables such as land use were analyzed to deduce fire risk. The results indicate that the Myagdi, Gorkha, and Baglung have the largest share of fire-prone areas, representing 44% of the total area falling within the fire-risk zone. Myagdi is the most hazardous district, which covers 17.35% of this fire-susceptible area, followed by Gorkha with 16.56%, and Baglung with 10.59%. Their rugged topography, steep slopes, shrubland, and high density of forests are these districts are so prone to susceptibility. Contrasting this, Parbat and Manang present very low fire hazard conditions because of cool climates, less vegetation cover, and river and snow barriers. These account for only 1.56% and 2.39% of the total fire-prone area. Principles of effective forest fire management emphasize the targeting of high-risk districts with appropriate measures concerning sustainable land-use practices, community participation, and enhancing monitoring activities within the province.

Keywords: Forest fire susceptibility, hazard mapping, risk factors, MaxEnt modeling, Gandaki Province

Introduction

Forest fires are a rising global concern, destroying millions of hectares of forest areas yearly. These have caused massive ecological losses by disrupting the balance of nature, causing a loss of biodiversity, human life, and socioeconomic development (Gao & Liao, 20170). The alarming trend has linked forest fires to a combination of anthropogenic activities and climate change (Robinne, 2021). Most of the terrible events in recent decades have been blamed on poor local forest management practices among other causes, exacerbated by climate change factors such as unprecedented protracted droughts and rising temperatures. The devastating wildfires in both Australia and the Amazon rainforest have been blamed on poor local forest management practices exacerbated by the impacts of climate change, including exceptionally prolonged droughts and increasing temperatures (Shukman, 2020). These come with serious repercussions, mostly irreversible damage to the ecosystems, habitat loss among innumerable species, and very heavy financial losses among the local communities and nations alike.

In recent years, forest fires have become a crucial factor in the deterioration of Nepal's forest ecosystems and, consequently, pose a variety of environmental problems. The main cause of this is human activities; it has been recorded that about 89% of forest fires usually originate during the dry season, specifically during March, April, and May (Bhujel et al., 2017). This peak fire season, characterized by prolonged low rainfall and high temperatures, seriously threatens the country's natural vegetation, besides causing massive damage to public and private properties. These fires have very depressing ecological consequences, including severe vegetation damage, threats to biodiversity, and disruption of ecosystem services that include soil fertility and water regulation. Moreover, forest fires destroy Non-Timber Forest Products (NTFPs) and promote invasive species, as well as pose great risks to

human life and infrastructure, which is why the management of forest fires is an urgent priority for both national and local authorities (Uys et al., 2018).

This is evident in the rising tide of research works on understanding the factors that underpin forest fires in Nepal, as incidents have increased over time. Indeed, more than 35,000 fire incidents reportedly occurred between 2000 and 2016, with estimated economic losses of over $107,000, 11 fatalities, and several injuries (Bhujel et al., 2017). It denotes human-induced fires, whether due to deliberate land-clearing practices or accidental ignitions, as the main cause of disturbance to Nepal's forest ecosystems and biodiversity. With the call for addressing the risks of forest fires in Nepal becoming increasingly important, modern technologies have been utilized to model the fire risk and map hazard zones. Recent developments in remote sensing, GIS technology, and statistical approaches have enhanced the understanding of the dynamics of forest fires, thus enabling the formulation of appropriate management strategies (Parajuli et al., 2020). In this respect, the present study examines the risks associated with forest fires and determines hazard zones in Gandaki Province, Nepal, thereby contributing to the development of a better framework of forest fire risk assessment and its management in the region.

Literature Review

On a global scale, forest fires are a significant contributor to anthropogenic greenhouse gas emissions and have negative impacts on the integrity of wildlife and ecosystems. Robinne (2021) estimates that between 2001 and 2018, about 7.2 billion hectares burned at an average of roughly 400 million hectares per year. This number is staggering and represents the growing need for good fire management practices. Although the total area burned during the period 2013-2018 was below the long-term average, according to FAO (2020), the risk associated with forest fires is already 1.1 times higher in contemporary climate conditions compared with that in pre-industrial times, and under future climate scenarios may double.

The situation is not different when it comes to Nepal. Some studies estimated that about 40,000 hectares of forest are burned every year, most in the dry seasons between February and May of each year. This is the period with low rainfall and high temperatures; hence, a period of high fire spread. The 2009 disastrous fires, which affected most people and caused immense destruction, indicate the severe effects of forest fires on human habitations as well as on the natural ecosystem. Land clearing, careless behavior of people, and deliberate ignition for land management on account of anthropogenic causes have been identified as the key factors (Parajuli et al., 2015).

The occurrence and magnitude of forest fires are increasing, and thus there is an urgent need for better tools to assess risk. Parajuli et al. (2020) developed fire risk models for two major landscapes in Nepal using remote sensing and GIS technologies to develop risk maps for early warning. This method is supported by the works of Jaiswal et al. (2020) and Erten et al. (2004), where fire risk zones were defined as areas with a high possibility of potential fire spread. Precise threat mapping may be thus considered as a tool not only to minimize negative impacts resulting from forest fires but also to provide input for resource allocation in fire management.

In this regard, quantitative evaluation models, including the Maximum Entropy Model (MaxEnt), are among the popular applications for the assessment of risks from forest fires (DoF, 2022). MaxEnt would preferably be applied since it requires merely a minimum amount of data and can predict the spatial distribution of fire risk with environmental variables. It has already outperformed a few other machine-learning methods in a couple of comparative studies, which makes it the most preferred by researchers who are focusing on forest fire prediction (Vilar et al., 2016; Kim et al., 2019). Geospatial models, now increasingly use satellite data to map fire risk indices, allowing researchers to pinpoint high-risk areas and strategize accordingly for fire management (Bowman & Murphy, 2010; Nelson & Chomitz, 2011).

Understanding the causes and dynamics of forest fires is rather an important aspect of developing effective mitigation strategies. The studies on the temporal-spatial pattern of fire occurrences will help classify areas that are prone to high risk, something which is important in implementing preventive measures and managing sources of ignition. They further help incorporate biophysical and human elements in their forest fire risk models to enhance their accuracy and relevance. Matin et al. (2017) pointed out that much of the research relating to district-specific fire patterns and risk mapping lacks district-level risk mapping, on which resource allocation should be based. Second, the management of fires needs to be made more inclusive of the resident's local communities; after all, their traditional knowledge of the local conditions will enrich the preventive measures for fires.

The various technological advancements have increased the availability of remotely sensed data to study forest fires; hence, helping in fire monitoring, risk assessment, and understanding of causes and effects that include (Bowman & Murphy, 2010; Nelson & Chomitz 2011). Common tools that are normally used to predict fire risks for forest fire modeling include MaxEnt, random forest, and regression tree analysis. This is especially effective, being simple yet accurate, outperforming many of these other models in many comparative studies (Phillips et al., 2006; Vilar et al., 2016; Kim et al., 2019).

Study Area

This study focuses on Gandaki Province, which is centrally located in Nepal and lies between 27° 26' 15" N - 29° 19' 15" N and 82° 52' 45" E - 85° 12' 01" E. It consists of 11 districts, namely Nawalpur, Tanahun, Gorkha, Lamjung, Kaski, Syangja, Parbat, Baglung, Myagdi, Manang, and Mustang. It has 85 local bodies comprising one Metropolitan City, 26 Municipalities, and 58 Rural Municipalities (MoITFE, 2018). It covers an area of 21,976.34 km² and constitutes 14.93% of the total land territory area of Nepal. According to the census 2021, the population of the province is 2,466,427; there are 662,480 households. The male population is 1,170,833, while the number of females is 1,295,594 (NSO, 2021).

Elevation varies from 104 meters at the southern part of Nepal (India border) on the Gandaki Canal of the Narayani River to 8,167 meters at Dhaulagiri, the highest peak. A lot of such geomorphological and physiographical features come within this varied topography of the province, which controls the pattern of forest fire susceptibility across the province.

Around 37.1% area of the province is covered by forest. Major tree species of the province are Sal, S*issoo, Khair, Rani salla, Chilaune, Katus, Utis* and G*obre salla*. The major forest management models exercised in the provinces are community forest management, collaborative forest management, and block forest management. A scientific forest management program has been launched in all these forest areas through the Nepal government. *Chiraito, Kutki, Panchaule, Lokta, Ban lasun, Satuwa, Atis, Nirmansi* are major Non-timber forest products (NTFPs) (MoITFE, 2018).
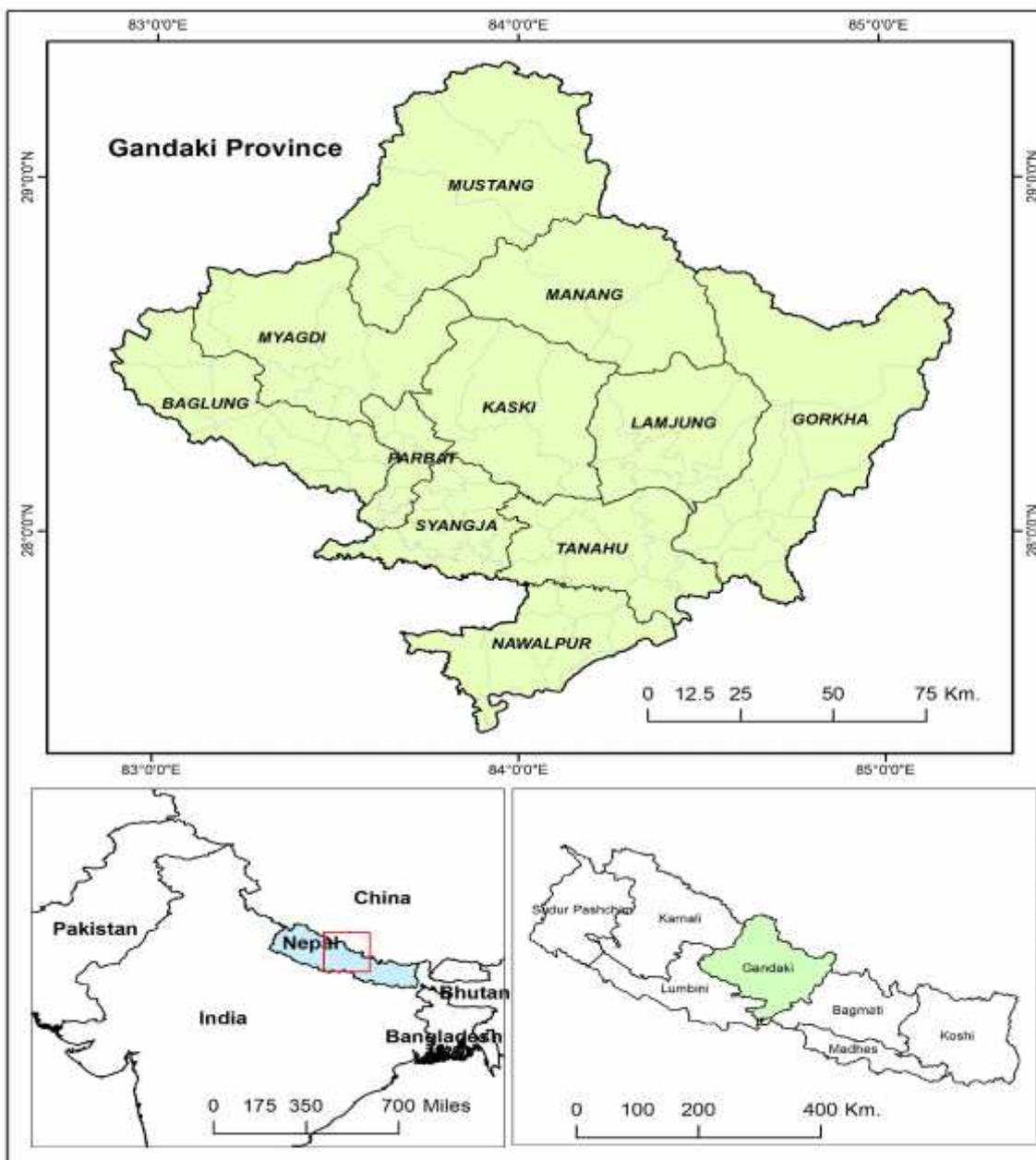

Figure 1: Location Map of the study area

The diversified geological and geographical features of Gandaki Province make it very prone to different kinds of natural hazards. Unplanned settlements, steep terrain, rapidly flowing rivers, and large areas of uncultivated land contribute greatly to their occurrence in that region. Human intrusion into these natural settings brings even higher risks, enhancing the frequency and intensity of disasters related to forest fires, among others. These combined factors make the hazard landscape complex, and management needs to be closely considered.

Materials and Methods

Materials

Key informants' interviews and focus group discussion for the current study was carried out in 2019. Preliminary consultations were carried out with government officials, including staff from the district administration office, district police office, district coordination committee, and representatives from municipalities and rural municipalities. Members of the Red Cross Society and elected community leaders from all 11 districts of Gandaki Province were also consulted to identify potential risk zones and locations prone to hazards. The following environmental variables were derived from free available databases, as shown in Table 1, before their processing with ArcGIS 10.8 to make their format uniform in ASCII format and their resolution in 30 m. Also, some of the variables whose data formats are vectorial (points and lines) were transformed to raster data with the same resolution.

Table 1: Environmental variables used for the study

Category	Variables	Source	Unit
Topographic	Aspect	(USGS, 2019)	degree
	Elevation		m
	Slope		degree
	Distance to water	(Geofabrik, 2019)	km
Climatic	Mean precipitation	(WorldClim, 2019).	cm
	Mean temperature		degree
	Mean solar radiation		
Vegetation Related	Mean EVI	(MODIS, 2019)	dimension less
	Forest	Global forest change (Hansen, et al., 2013)	dimension less
Anthropogenic	Land use land cover	(ICIMOD, 2010)	type
	Distance to road	(Geofabrik, 2019)	km
	Distance to path		km
	Distance to settlement	Department of Survey, Nepal	km

Methods

MaxEnt, or Maximum Entropy, is a software tool that models species distributions using geo-referenced occurrence data along with environmental variables to predict the suitable habitat of a species (Phillips et al., 2006). It was firstly designed for ecological studies and then used in the prediction of the distribution of various plants and animals (Guisan, et al., 1998; Pearce & Ferrier, 2000; Gillespie & Walter, 2001; Phillips et al., 2006). It also has recently been used to predict natural hazard risks such as forest fire, flood, and landslide events (Goetz, et al., 2011). Environmental variables presented in Table 1 and hazard occurrence data were input in MaxEnt version 3.4.1 to model the potential disaster risk zones of this work. The model used 1000 maximum iterations, as suggested by Barbet-Massin et al. (2012), and was run for ten replicates. A data split was performed technique where 70% goes to training, while the remaining 30% goes to the validation of the models. Based on the findings of Liu et al. (2013), the MaxSSS threshold was chosen for changing continuous probability maps into binary maps. To prepare the forest fire susceptibility map of the present study area, this threshold was applied.

Accuracy Assessment

An accuracy assessment was carried out to establish the reliability of the susceptibility map using both threshold-independent and threshold-dependent methods. The threshold-independent method AUC has been utilized to evaluate model performance, measured by the area under the ROC curve. An AUC score of <0.7 indicates poor performance, 0.7-0.9 denotes moderate usefulness, while >0.9 suggests excellent performance (Pearce & Ferrier, 2000). The threshold-dependent method utilized the True Skill Statistics, computed as TSS = Sensitivity + Specificity − 1, within a range between −1 and 1 (Allouche et al., 2006). The TSS value less than 0 reflects unsatisfactory model performance, whereas 1 represents a perfect fit. The TSS was averaged over 10 model outputs, and the threshold used to maximize the TSS was used to transform the continuous susceptibility map into a binary map (Liu et al., 2013; Jiang et al., 2014).

Findings and Discussions

Factors determining the forest fire risk zone

In this study, the most important contribution was the determination of the contributing factors to forest fire susceptibility, focusing on those core variables that dictate fire risk. The results given by the MaxEnt model allowed one to perceive the relative importance of different environmental factors assessed through regularized training gain. This latter term measures how much better the model fits the occurrence data compared to a uniform distribution. The description of model performance includes all the variables, "with only variable" refers to the performance of the model on the removal of a certain variable, whereas "without variable" refers to a model run only when that particular variable is included as per Phillips (2017). Here, lower regularized training gain for only one variable contributes to indicating a higher contribution to forest fire susceptibility; and a higher value contributes to a lower effect.

The results show that the most contributing factors to forest fire risk, according to the MaxEnt model, are related to elevation, temperature, distance to water bodies, and rainfall. These factors are those that most greatly affect the spatial pattern of areas prone to fire, where lower elevation, higher temperature, and reduced distance toward water sources are highlighted as principal factors increasing fire susceptibility in the area under investigation. The resultant output in ranking order presents the various environmental variables that best explain the zoning of fire risk in the forests of Gandaki Province, Nepal. These results also tend to indicate that while some variables have a very significant influence on fire risk prediction, others contributed moderately or minimally.

The top-scoring variables according to the highest regularized training gain are mean precipitation, mean temperature, and elevation. These are seemingly some of the most important factors to consider during the risk modeling process. Mean precipitation simply indicates that the lower precipitation areas are at a higher danger of experiencing fires because low rainfall simply sets the stage for ignitions and propagations to occur easily and efficiently. The mean temperature is a similarly important factor and the regions that are usually hotter tend to have a higher proclivity for fire since the proclivity for dryness and the actual weather of the location are right for the propagation of a fire. Probably due to changes in elevation, temperature, vegetation types, and moisture change significantly with altitude variations; it is an essential factor for fire. Elevation is another important factor.

The Mean solar radiation and land use/land cover, including forest cover, realize considerable increase, thus proving that they are very influential in fire risks, but at a slightly lower level than the ones of climatic origin. This is because land use or land cover is important in that areas with dense vegetation are more prone to fire since fuel is readily available. Mean solar radiation impacts surface temperatures and contributes to vegetation drying, thus increasing the chances of fire. On a similar thought, forest cover has to do with highly forested areas developing bigger and more destructive fires due to the abundance of material to burn.

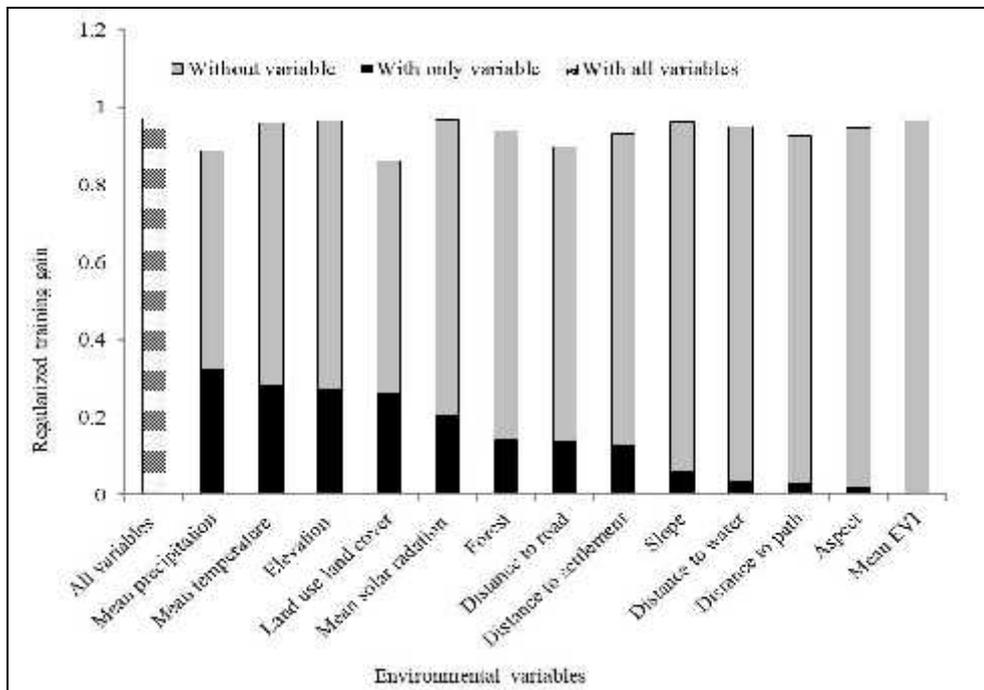**Figure 2: Importance of variables to train the forest fire risk model**

Other factors-distance to roads, distance to settlement, slope, and distance to water-show a more moderate impact on fire risk. Although each of these variables taken individually contributes less, they are relevant in their joint consideration for the analysis of fire risk. These might include distance to road and settlement, which features the

proximity of humans, raising the danger from human-caused fires, such as those from the clearing of land or other unintentional ignitions. The slope is one-factor affecting fire spread; in general, fires travel uphill faster. Distance to water sometimes serves as a natural firebreak that may reduce the spread of a fire in those areas near the body of water.

The last three factors, which have less individual influence yet are still a part of the overall risk model, are aspect, distance to path, and mean Enhanced Vegetation Index. Aspect influences a slope's received solar radiation, which again controls vegetation dryness and, therefore, fire susceptibility. Mean EVI is an indication of vegetation health and density and would therefore be indicative of fire susceptibility but seems in this case to have less direct influence on this model.
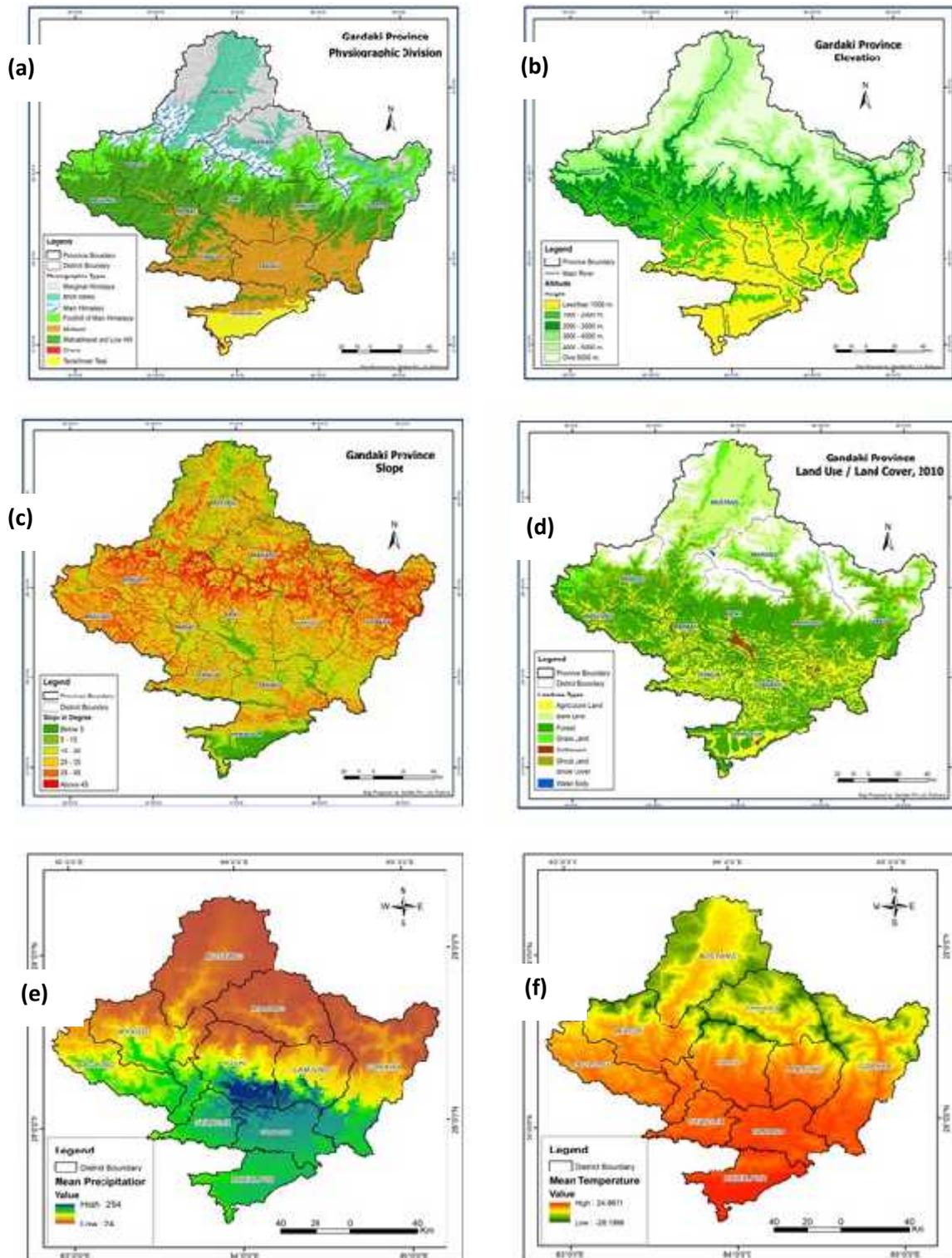

Figure 3: Factors determining the forest fire risk
Source: USGS, 2019 of (a) Physiography (b) Elevation (c) Slope; ICIMOD-2010 of (d) LULC; and WorldClim - 2019 of (e) Mean Precipitation (f) Mean Temperature

The risks of forest fire in Gandaki Province are primarily governed by physiography, elevation, slope, LULC, precipitation, and temperature (Figure 3). Generally, areas of low elevation, particularly the Terai and mid-hills, are considered at risk due to high vegetation and dry conditions; whereas, high-altitude regions such as Mustang and Manang fall into a low-risk category due to the scarce density of vegetation and colder climatic conditions. Steep slopes, as illustrated in the slope map, accelerate fire spread, especially in the mid-hill and mountainous regions since slopes above 45° pose greater risks. In the LULC map, forests in mid-hill and low mountains are very vulnerable to fires, especially during dry seasons. Human activities related to agriculture near forests also enhance the risk of fire.

Precipitation and temperature fluctuations also affect the vulnerability of land to fire. Southern regions with relatively high temperatures and irregular rainfall have much more propensity to catch fires because vegetation tends to dry up. In northern areas, temperatures are cooler, and the quantities of rainfall are lower, where the risk of such fire is lesser; however, small-scale fire is likely to happen when it is extremely dry.
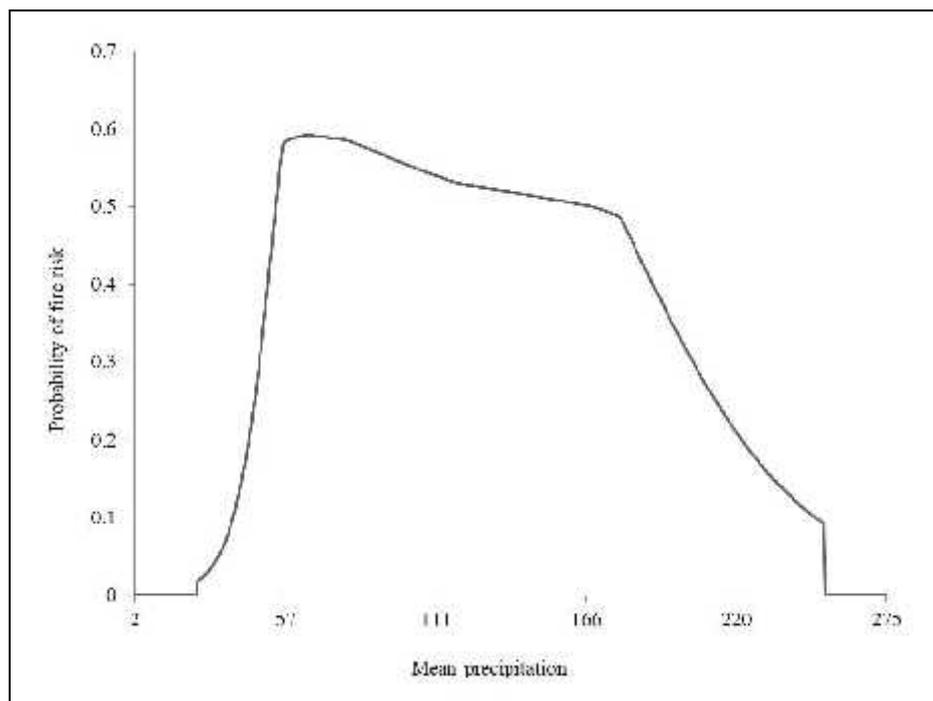

Figure 4: Response of fire risk to mean precipitation

In the graph at left, the curve depicts the relationship between mean precipitation and the probability of fire risk (Figure 4). This curve follows roughly a bell-shaped pattern. Starting from low precipitation, fire risk increases with rising precipitation, then peaks around a precipitation value of about 57 mm. past this peak, the probability of fire risk decreases linearly with increased precipitation.

This would suggest that moderate precipitation creates conditions that are opportune for forest fires. In such periods, adequate moisture prevails for vegetation to grow, while it could be used as fuel for fires. On the other hand, rainfall is not high enough to keep biomass moisture high, and so the region becomes prone to ignition. When the precipitation value exceeds a threshold value of 111–166 mm, the environment becomes relatively wet, decreasing the likelihood of fires due to higher moisture levels that may impede the easy firing of vegetation.

In other words, low and extreme precipitation both reduce fire risk, while fire danger is highest for moderate levels of precipitation. This pattern shows that for ecosystems, there is a narrow window of precipitation where fire hazards increase greatly. This conclusion also agrees with global patterns, where large fire outbreaks occur usually during dry seasons or after a moderately wet year because of the amount of dry, combustible material available and due to the favorable weather toward ignition and fire propagation.

The result shows the probability of fire risk concerning land cover types; it can be shown that different land covers perform differently concerning fire hazard (Figure 5). Shrub land, broadleaved open forest, and needle-leaved open forest have high probabilities of fire risk, while rivers, snow/glacier areas, and built-up areas have the lowest probabilities.

Shrubland and open forests are less dense compared to other vegetation classes, thus being highly vulnerable to fires. Areas in such categories may have vegetation that is arid and of lowlands nature and may be characterized as light

fuel to the spread of fire for a period of a dry season or in areas with moderate rainfall. The region catches fire easily because the area has combustible materials, accompanied by heat and wind exposure. Broadleaved closed forests and needle-leaved closed forests, on the contrary, have lower risks from fire as compared to their open categories of woods. This probably is due to the more humid microclimate created by a close canopy, thereby decreasing the possibility of the fire reaching the forest floor. The canopies also contribute to holding moisture within their cover, hence making the overall forest even less flammable.
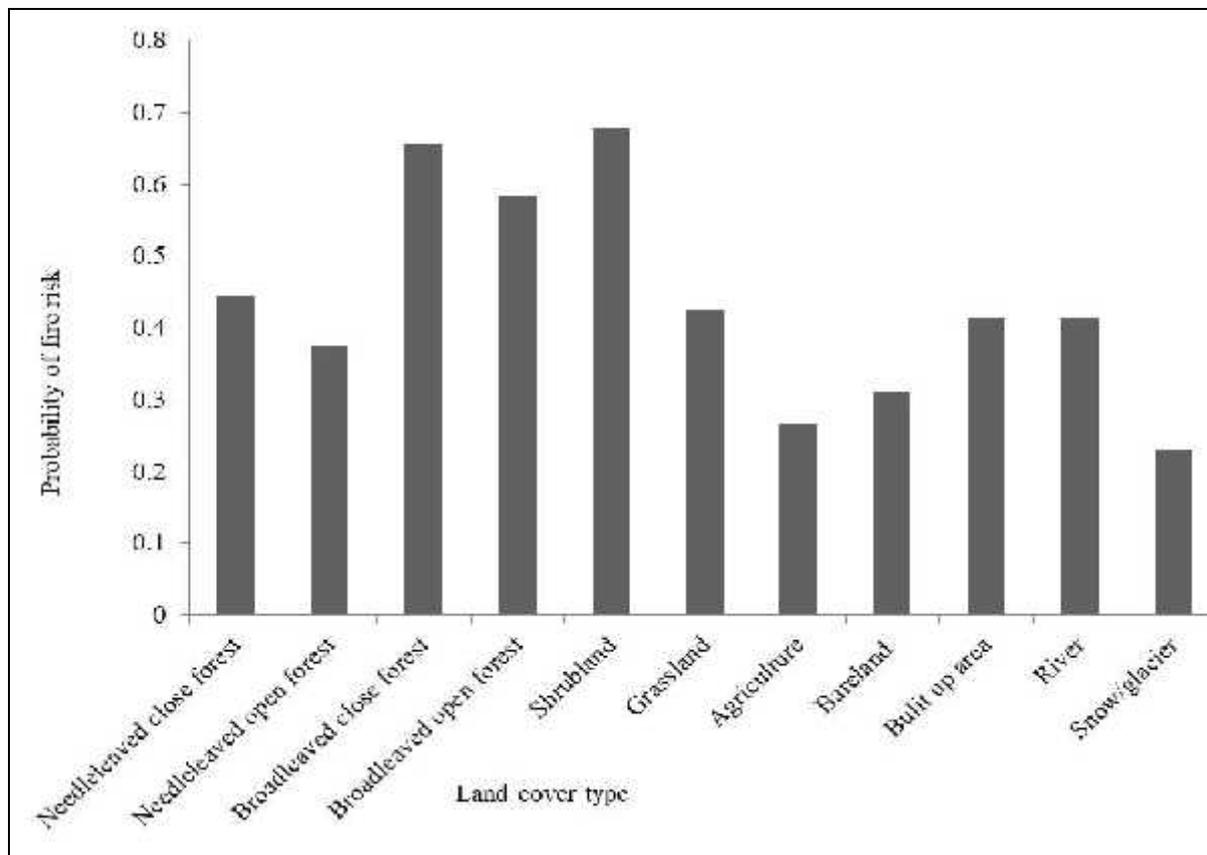

Figure 5: Probability of landslide risk to land use land cover type

Grassland also has a high fire hazard since grasslands are known to dry off quite rapidly, therefore offering considerable fuel for wildfires. With less vegetation, the similar-looking landscapes over vast expansions make grasslands more prone to widespread fires, especially in periods of dry weather. Agricultural land presents a medium fire hazard, probably because fire is used in land clearing for agriculture. The risk is still smaller, however than in natural sceneries, where broad vegetation cover makes such areas more flammable. Intuitive enough, the lowest fire risk is demonstrated by built-up, rivers, and snow-covered areas. Large built-up areas generally have fire management systems in place and less combustible material, whereas rivers and snowy regions act like natural firebreaks that prevent the spread of a fire.

The presented analysis of precipitation and land cover types underlines a very complex interplay of natural and human-modified landscape factors that determine fire risk. On one hand, moderate precipitation favors vegetative growth that later will act as fuel for fires. At the same time, the territories of shrublands and open forests show high vulnerability to outbreaks of fires, drawing attention to special management interventions in these zones.

This will indeed be useful to understand while devising effective fire management strategies within Gandaki Province. Mitigation efforts should, therefore, target high-risk ecosystems such as shrublands and open forests, given the variability of precipitation patterns on fire risk. Local agricultural activities and land-use practices will also have to be carefully monitored, especially during periods of low rainfall when the fire hazard may be higher.

Forest Fire Susceptibility Mapping of Gandaki Province

Finally, this study predicted and mapped the forest fire risk zonation throughout the Gandaki province (Figure 6, Table 2). Shrubland, broadleaved close forests and other forests, and grassland are identified as major factors contributing to the forest fire risk zone.

The High Mountains and Terai regions are identified as major fire risk zones. A total of 6,349 km^2 area is identified as a fire risk zone in Gandaki province. A threshold (0.255) to maximize the sum of sensitivity and specificity was

used to change the probabilistic map to binary risk-free zones. The high Himalayan and middle hills have low fire risk. In the middle hills there is more forest broadleaved close forests and shrubland so these regions have more fire-prone areas.

Out of 11 districts of the province Myagdi, Baglung, and Gorkha districts have more fire risk areas whereas Parbat and Manang districts have less fire risk areas (Table 2). Probably, these districts have more vegetation cover as a result they have more fire risk.

Table 2: District-wise fire risk area

S. No.	Districts	Fire risk area	
		Area (Km^2)	Percentage
1	Baglung	672.66	10.59
2	Gorkha	1051.23	16.56
3	Kaski	681.97	10.74
4	Lamjung	813.23	12.81
5	Manang	151.88	2.39
6	Mustang	376.76	5.93
7	Myagdi	1101.57	17.35
8	Nawalpur	787.98	12.41
9	Parbat	98.96	1.56
10	Syangja	208.21	3.28
11	Tanahun	404.55	6.37
	Total	**6349.00**	**100.00**

The district-wise data on the Gandaki Province, Nepal, regarding the forest fire potential area, shows considerable spatial variation of fire risk across the region. There is a large number of districts with higher conglomeration of fire-prone areas. Out of the total area of 21,976 km^2 of Gandaki province, the MaxEnt model derived that, there is area of the potential forest fire risk is 6349 km², which is distributed variably among 11 districts (Figure 6). Further, such data may be used in critical analyses to search for possible drivers of fire risk and inform appropriate fire management strategies.

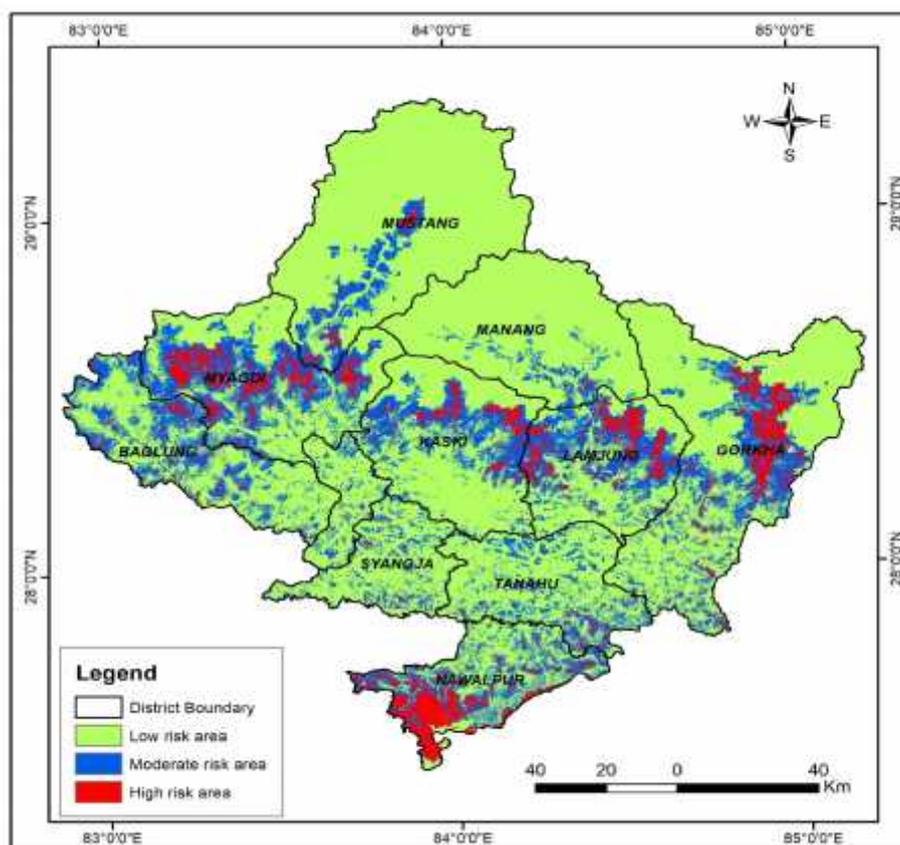**Figure 6: Forest fire susceptibility map of Gandaki Province**

Among the districts, Myagdi, Gorkha, and Baglung have the largest proportion of forest fire risk areas, combining more than 44% of the total fire risk within the province. Myagdi alone has the largest area at risk with 1,101.57 km² (17.35%), but the second is Gorkha with 1,051.23 km² (16.56%), while the area covered by Baglung is 672.66 km²

(10.59%). These districts are rugged in topography, steep slopes, and with diversified types of forests, and shrub land which may enhance the vulnerability of fire by accumulating dry biomass and being highly exposed to wind. This fire risk may be much more pronounced because of the interaction between these topographic factors and human activities such as deforestation or slash-and-burn agriculture.

Lamjung, Kaski, and Nawalpur also come under considerable fire-risk areas that share more than 36% of the total area. These three districts are almost identical in geographical and ecological conditions and therefore depict moderate fire-risk indicators. Lamjung shares 12.81%, Kaski 10.74%, and Nawalpur 12.41%. These places are very vital because they have high biodiversity, and any increment in occurrences of fires might have detrimental effects on the local ecosystems and efforts of biodiversity conservation. This requires moderate but fairly targeted fire prevention efforts against local vulnerabilities such as dry types of forests and agricultural burning practices that contribute to the total fire risk at the province level.

On the opposing, districts such as Parbat, Manang, Syangja, Mustang, and Tanahun contain areas prone to fires that contribute much less to the respective zone. With only 98.96 km² and 151.88 km² areas of fire risk, respectively, Parbat and Manang are the two districts with the least area of fire risk in the province. It could be explained by several factors including cooler climates and less vegetation in Manang. An arid environment keeps Mustang, despite that, contributing about 5.93 percent because of the highly vulnerable dry shrubland and grassland zones to wildfire.

This difference in fire risk across the districts conveyed that uniformity in approach may not work concerning fire management in Gandaki Province. High-risk districts such as Myagdi, Gorkha, and Baglung require immediate attention regarding fire prevention and control (Figure 6). Some initiatives regarding that would be community-based fire monitoring, improvement of fire management policies, and popularization of sustainable land-use practices.

Correspondingly, low-risk districts like Parbat and Manang may not need such a high level of concentration; still, precautionary measures should be provided in case there is an outbreak of a wildfire somehow. What's more, the general vegetation density in Mustang is pretty low, but the fire spreads fast in that type of landscape and destroys the local ecosystem.

Model accuracy of fire risk modeling

The accuracy metrics of the model are shown in Table 3. The threshold-independent method AUC has a value of 0.758±0.072, whereas the threshold-dependent method measured by TSS produced a value of 0.484±0.122. The optimal threshold value found was 0.255, for which the sum of sensitivity and specificity was maximum. This threshold was used for the calculation of TSS, and also for transforming the continuous risk map into a binary map of risk and non-risk zones.

Table 3: Accuracies of different replications of fire risk modeling

Replication	0	1	2	3	4	5	6	7	8	9	Average	Std
Threshold	0.360	0.190	0.080	0.600	0.070	0.210	0.460	0.240	0.230	0.110	0.255	0.172
AUC	0.802	0.700	0.678	0.649	0.702	0.847	0.850	0.822	0.763	0.762	0.758	0.072
TSS	0.606	0.384	0.381	0.276	0.414	0.574	0.662	0.584	0.468	0.495	0.484	0.122

Conclusion

The study on forest fire susceptibility in Gandaki Province, Nepal, infers that the risk of fire might be highly varied in space in its 11 districts, based on a complex interaction of environmental and climatic factors. Other than precipitation, the most contributing factors to forest fire risk by using a MaxEnt model are elevation, temperature, and proximity to water bodies. Low precipitation combined with high temperatures contributes to fire incidents, especially in regions with a high vegetation cover like forests and shrublands.

From the district-level data, Myagdi, Gorkha, and Baglung have the highest shares of fire risk zones, with about 44% of the total fire-prone area in the province. The fire risk area is very huge in Myagdi with an area of 1,101.57 km², adding 17.35% of the total area, followed by Gorkha with an area of 1,051.23 km² (16.56%), and then Baglung with an area of 672.66 km² (10.59%). These districts fall within rugged topography, steep slopes, and massive areas of forest cover. Besides this, the nature of the forest due to its dry biomass accumulation in the forest increases the rate of vulnerability towards forest fires.

In Lamjung, Kaski, and Nawalparasi districts, it is very high too, ranging between 10.74% and 12.81% of the total fire-prone areas. Due to similar ecological and geographical characteristics, they share every likelihood of catching

fire, especially during dry periods. Targeted methods of fire management are effective measures against large-scale outbreaks and risks to ecosystems.

Therefore, places like the Parbat district, covering 98.96 km² and accounting for 1.56%, and the district of Manang, covering 151.88 km² and accounting for 2.39%, are those districts that have the least fire hazard. Such geographical features as cooler climates, less density of vegetation, and natural obstacles like rivers and snow-covered lands can act to establish a firebreak that will retard or stop fires from spreading in these areas.

In general, the findings of this study have established that fire risk in Gandaki Province is highly connected with environmental factors like precipitation, temperature, and elevation, and also land cover types such as shrublands and open forests, whereas the lowest fire risks were observed to be for built-up areas and those areas with important water bodies. The fire management strategies should henceforth give ample priority to the high-risk districts, especially Myagdi, Gorkha, and Baglung Districts while taking precautionary measures in relatively low-risk districts to protect against future potential outbreaks. Gravitating toward sustainable land-use practices, better fire monitoring systems, and community involvement are all keys to reducing fire risks and enhancing ecosystem resilience across Gandaki Province.

References

Allouche, O., Tsoar, A., & Kadmon, R. (2006). Assessing the accuracy of species distribution models: prevalence, Kappa, and the True Skill Statistic. *Journal of Applied Ecology*, *43*(6), 1223-1232.

Barbet-Massin, M., Jiguet, F., Albert, C. H., & Thuiller, W. (2012). Selecting pseudo-absences for species distribution models: how, where, and how many? *Methods in Ecology and Evolution*, 3(2), 327-338.

Bhujel, K.B., Maskey-Byanju, R., & Gautam A.P. (2017). Wildfire dynamics in Nepal from 2000–2016. *Nepal Journal of Environmental Science, 5*, 1–8.

Bowman, D.M.J.S., & Murphy, B.P. (2010). Fire and biodiversity. In Conservation, *Biology for all*, 163–180.

D. Shukman. (2020). *Sir David Attenborough Warns of Climate Crisis Moment*, BBC [Online]. Available: https://www.bbc.com/news/science-environ.

DoF (2022). *Forest fire detection and monitoring system in* Nepal, Kathmandu. http://nepal.spatialapps.net/NepalForestFire/EN.

Erten, E., Kurgun, V., & Musaoglu, N. (2004). Forest fire risk zone mapping from satellite imagery and GIS: a case study, in *XXth Congress of the International Society for Photogrammetry and Remote Sensing*, 222–230. Istanbul, Turkey.

FAO. 2020. *Global forest resources assessment 2020*: Main report. Rome: Reforming China's Healthcare System. https://doi.org/10.4060/ca9825en.

Geofabrik. (2019, 05 20). Geofabrik. Retrieved from www.geofabrik.de: https://www.geofabrik.de/data/shapefiles.html.

Gillespie, T., & Walter, H. (2001). Distribution of bird species richness at a regional scale in the tropical dry forest of Central America. *Journal of Biogeography*, *28*(5), 651-662.

Goetz, J., Guthrie, R., & Brenning, A. (2011). Integrating physical and empirical landslide susceptibility models using generalized additive models. *Geomorphology*, *129*, 376-386.

Guisan, A., Theurillat, J.-P., & Kienast, F. (1998). Predicting the potential distribution of plant species in an alpine environment. *Journal of Vegetation Science*, *9*(1), 65-74.

Hansen, M., Potapov, P., Moore, R., Hancheer, M., Turubanova, S., Tyukavina, A., et al. (2013). High-resolution global maps of 21st-century forest cover change. *Science, 342,* 850-854.

ICIMOD. (2019, 06 02). *ICIMOD*. Retrieved from www.icimod.org: http://www.icimod.org

Jaiswal, R.K., Mukherjee, S., Raju, K.D., & Saxena, R. (2002). Forest fire risk zone mapping from satellite imagery and GIS. *International Journal of Applied Earth Observation and Geoinformation, 4(1)* 1–10,

Jiang, Y., Wang, T., Bie, C.D., Skidmore, A., Liu, X., Song, S., et al. (2014). Satellite-derived vegetation indices contribute significantly to the prediction of epiphyllous liverworts. *Ecological Indicators*, 38, 72-80.

Kim, S.J., Lim, C., Kim, G.S., Lee, J., Geiger, T., Rahmati, O., Son, Y., & Lee, W. (2019). Multi-temporal analysis of forest fire probability using socio-economic and environmental variables. *Remote Sensing, 11*, 1–19. https://doi.org/10.3390/rs11010086.

Liu, C., White, M., & Newell, G. (2013). Selecting thresholds for the prediction of species occurrence with presence-only data. *Journal of Biogeography*, *40*(4), 778-789.

Matin, M.A., Chitale, V.S., Murthy, M.S.R., Uddin, K., Bajracharya, B., & Pradhan, S. (2017). Understanding forest fire patterns and risk in Nepal using remote sensing, geographic information systems, and historical fire data. *International Journal of Wildland Fire, 26*, 276–286.

Mishra, B., Panthi, S., Poudel, S., et al. (2023). Forest fire pattern and vulnerability mapping using deep learning in Nepal. *Fire Ecology*, *19*, 3. https://doi.org/10.1186/s42408-022-00162-3.

MODIS. (2019). NASA/Moderate Resolution Imaging Spectroradiometer. Retrieved 2019, from https://modis.gsfc.nasa.gov/

MoHA. (2017). *Nepal Disaster Report*, 2017: The Road to Sendai. 2018. Kathmandu: Minister of Home Affairs.

MoHA. (2018). *National Policy for Disaster Risk Reduction*. Government of Nepal, Kathmandu.

MoITFE. (2018*). Status paper*. Pokhara: Ministry of Industry, Tourism, Forest and Environment, Gandaki Province.

Nelson, A., & Chomitz, K.M... (2011). Effectiveness of strict vs. multiple use protected areas in reducing tropical forest fires: A global analysis using matching methods. *PLoS One, 6*. https://doi.org/10.1371/journal.pone.0022722.

NSO. (2021). National Population and Housing Census 2021 (National Report). In *National Statistics Office, 39*, 1. https://censusnepal.cbs.gov.np/results/downloads/national.

Parajuli, A., Chand, D.B., Rayamajhi, B., Khanal, R., Baral, S., Malla, Y., & Poudel, S. (2015). Spatial and temporal distribution of forest fires in Nepal, *XIV WORLD FORESTRY CONGRESS*, Durban, South Africa, 7-11 September.

Parajuli, A., Gautam, A.P., Sharma, S.P., Bhujel, K.B., Sharma, G., Thapa, P.B., Bist, B.S., & Poudel, S. (2020). Forest fire risk mapping using GIS and remote sensing in two major landscapes of Nepal. *Geomatics, Natural Hazards and Risk*, *11*, 2569–2586. https://doi.org/10.1080/19475705.2020.1853251.

Pearce, J., & Ferrier, S. (2000). Evaluating the predictive performance of habitat models developed using logistic regression. *Ecological Modelling*, *133*, 224-245.

Phillips, S. J. (2017). *A Brief Tutorial on Maxent*. Retrieved 08 10, 2018, from http://biodiversityinformatics.amnh.org/open_source/maxent

Phillips, S., Anderson, R., & Schapire, R. (2006). Maximum entropy modeling of species geographic distributions. *Ecology modelling*, *190*, 231-259.

Phillips, S.B., V.P. Aneja, D. Kang, & S.P. Arya. (2006). Modelling and analysis of the atmospheric nitrogen deposition in North Carolina. *International Journal of Global Environmental Issues* 6: 231–252. https://doi.org/10.1016/j.ecolmodel.2005.03026.

Robinne, F.N. (2021). *Impacts of disasters on forests, in particular forest fires*, UNFFS Background paper.

USGS. (2019, May 02). *Earth explorer*. Retrieved from Earth Explorer: https://earthexplorer.usgs.gov

Uys, R.G., Bond, W.J., & Everson, T.M. (2004). The effect of different fire regimes on plant diversity in southern African grasslands*. Biological Conservation, 118(4)*, 489–499.

Vilar, L., Gomez, I., Martínez-vega, J., Echavarría, P., & Rai, D. (2016). Multitemporal modeling of socio-economic wildfire drivers in central Spain between the 1980s and the 2000s: Comparing generalized linear models to machine learning algorithms. *PLoS One, 11*, 1–17. https://doi.org/10.1371/journal.pone.016144.

WorldClim. (2019, 5 10). WorldClim database. Retrieved from www.worldclim.org: http://worldclim.org

X.P. Gao, & Liao, S.Z. (2017). Design and implementation of forest fire probability prediction system based on Bayesian network. *Computer Engineering and Applications Journal,* 53, 246–251.

Consequences of Foreign Direct Investment on Inflation

Sanjeev Nhemhafuki
Central Department of Economics,
Tribhuvan University

Subin KC
Central Department of Economics,
Tribhuvan University

Resham Thapa-Parajuli
Central Department of Economics,
Tribhuvan University
Email: resham.thapa@cdec.tu.edu.np
(*Corresponding author*)

Abstract

This paper analyses the relationship between inflation measured in terms of CPI and FDI, GDP, and population. The paper intends to examine the consequences of FDI on inflation. The unbalanced panel data of 88 countries from 1970 to 2021 was employed for the said purpose. The empirical results have been estimated using Pooled OLS, Fixed Effect, and Random Effect Model. Moreover, control variables GDP and Population were introduced to strengthen the causal conclusion. Fixed Effect model was used for the analysis. The poolability of the data is tested by the Breusch and Pagan LM test which confirmed that Pooled OLS is not appropriate for the model. The Hausman Specification Test was then conducted to choose between the Fixed Effect or Random Effect model. The Hausman Specification Test for the Model suggests that the fixed effect model is appropriate for data analysis. Thus, fixed effect regression is used to find the consequences of explanatory and the control variables on the dependent variable. FDI as an explanatory variable has a negative relationship with Inflation, even in the case of controlling GDP and Population. The control variable, GDP, displayed a negative association with Inflation, while Population is depicted to have a positive relationship with Inflation.

Keywords: Inflation, FDI, GDP, Population, Fixed Effect

Introduction

Inflation

Inflation is one of the most regularly used lexicon in the field of Economics. Though it is used in the regular basis, it becomes alarming all of a sudden depending on the macroeconomic situation of a country. It is because high and persistent inflation fundamentally undermines public confidence in the economy and in the management of economic policy which results in an adverse effects on risk-taking, investment, and other productive activities because public would be sensitive to the potential risk of the inflation and directing their resources in managing the inflation (Bernanke 2007).

However, inflation in itself isn't a bad idea if it is low and stable. Low and stable inflation brings stability to financial systems and fosters sustainable economic growth over the longer run (Roger W. Ferguson 2005). Mainly developing country wants mild inflation in the economy for the growth and development of the country.

Inflation means a rise in the general price level of goods and services or depreciation of the value of money in an economy over some time (Öner 2012). Inflation thus reduces the purchasing power of money. The process of continuous and appreciable rise in the general price level that decreases the value of money over some time due to many causes is known as inflation (Emeru 2020). In the Economic world, inflation is one of the macroeconomic variables that affect other several variables such as real economics, interest rate, saving, economic growth, GDP, and many more.

Inflation may affect the economy in both positive and negative ways. Negative effects of inflation include an increase in the opportunity cost of holding money, and uncertainty over future inflation which may discourage investment and savings (Mankiw 2011). Positive effects include reducing the real burden of public and private debt, keeping nominal interest rates above zero so that central banks can adjust interest rates to stabilize the economy, and reducing unemployment due to nominal wage rigidity (Grier and Grier 2006).

Recently, inflation has been a hot topic for debate amongst individuals, businesses, governments and scholars. Headlines as "Fears of High Inflation Getting Worse?"; "Consumer Prices Jump"; "Inflation Marks Quickest Pace in More than a Decade" is getting the attention amongst public more than ever. And people can't agree anymore with the news and media reports. It is because Inflation succeeds in touching the lives of the ordinary citizen posing a grave threat to any political system (Ikani 1989). The inflation has been a global phenomenon since many decades and continues to affect the economic activities (Al-Shammari and Al-Sabaey 2012).

There could not be any better time than this to discuss and introduce the topic on the table. It is because the inflationary pressures and a broad price increase is being experienced all across the globe. US, in the wake of the COVID-19 pandemic, inflation reached 8.5%, its highest rate since 1982 (STATISTICS 2022). Similar is the story in the case of UK too. According to ONS (2022) UK experienced Annual of 8.8% CPIH highest since 1991. Germany also has hit the record of highest inflation of 10.4% which is the highest since 1974 (Startseite 2022). All of the abovementioned countries were experiencing stable price level since the decades of 1970s. The 1970 was a decade of inflation and more precisely the "stagflation" (Blinder 1982).

Foreign Direct Investment (FDI)

An investment made by the foreign nationals in the said country is referred to as Foreign Direct Investment. OECD (2008) defines FDI as a category of cross-border investment made by a resident in one economy (the direct investor) with the objective of establishing a lasting interest in an enterprise (the direct investment enterprise) that is resident in an economy other than that of the direct investor. FDI helps in increasing capital inflow as the additional sources of financing in the economy (Qin and Ozturk 2021). Domar (1950) focuses on the dual role of investment. One hand, new investment generates income and effective demand. On the other, it increases productivity capacity of the economy by expanding capital stock. The FDI plays a crucial role of internationalizing economic activity and it is a primary source of technology transfer and economic growth (Lenka and Sharma 2014).

FDI fosters and maintains economic growth, in both the recipient country and the country making the investment. In Developing countries, FDI helps in financing the construction of new infrastructure and the create jobs for their local workers while multinational companies expand their footprints into international markets. KUTAN and VUKSˇIC´ (2007) finds that FDI inflows contributed to higher supply capacity which ultimately led to more exports. FDI improves the export capacity of domestic firms. The linkage between the indigenous suppliers, foreign direct investment, and domestic sources has a spillover effect through backward connection. Agrawal (2015), Sengupta and Puri (2018), Verma (2020) conform the positive association amongst the FDI and Economic growths in the economies of concerns in all of the studies.

Along with Economic growth and development, FDI also plays its part in influencing the socio-economic development of the economies, mainly the host economies. Sattar, Hassan et al. (2022) found the long-run relationship between FDI and Socio-economic development by analyzing FDI's impact on poverty reduction, human capital development, social safety in the economies under consideration. FDI strongly influences poverty reduction in poorer countries. Poverty reduction can be attained through the realization of the FDI inflows in the poorer regions (Ganic 2019).

But, the effectiveness of the FDI depends on the volume of the FDI as well as the level and the quality of the human capital, physical infrastructures and institutions of the host country. Basnet and Pradhan (2014) suggests that the countries at initial phase of the development may lack the absorptive capacities required to exert a perceptible effect on economic growth. Kaushal (2022) recommends prioritizing improved governance based on the finding that Countries with strong institutions, good governance, and transparent and stable legal regimes are the preferred investment destinations.

Population

In every theory of production function, role of Population, particularly the share of labor in the total population, is pivotal. Labor is an essential input to produce goods and services. In all the classical, neoclassical theories of economic growth from (Smith 1776), (Ricardo 1904), (Harrod 1939), (Domar 1946), (Lewis 1954), (Rostow 1959) stress the importance of labor and its dynamics in the economic growth and the development. Also in the Endogenous growth theory by (Lucas 1988), (Rivera-Batiz and Romer 1991) emphasizes on labor mobility which will enhance the productivity as well as enhance growth. The Modern Economic theory by Stiglitz (1969) explains the role of innovation and entrepreneurship in driving economic growth. The author believes that policies that encourage innovation and entrepreneurship can lead to sustained economic growth.

The population is, in fact, a naturally endowed resource for economic development in all the economies. DAM (1976) argues that population growth can lead to economic development with proper policy management. However, the author also argues that it also could have negative impacts, such as environmental degradation and social unrest, if the management of the population policies. The long-term economic development of a country is essentially dependent on the quality of its institutions and the human capital of its citizens (Acemoglu, Gallego et al. 2014). Nevertheless, in low-income countries, rapid population growth is not always favourable in the short and medium term. But, in the longer run, population growth is an important factor in producing overall economic growth and contributes to increased growth in per capita output (Peterson 2017)A higher population means higher demand for goods and services. Population indicates the market size of any given economy. Also, a higher fraction of young and productive people denotes the labor force of the economy of concern.

Gross Domestic Product (GDP)

GDP (Gross Domestic Product) measures the monetary value of final goods and services—that is, those bought by the final user—produced in a country in a given period (say, a quarter or a year). It counts all the output generated within the borders of a country. GDP is composed of goods and services produced for sale in the market and also includes some nonmarket production, such as defence or education services provided by the government (Callen 2008). GDP is, even though not thoroughly, considered as a measure of social welfare (Bergh 2007). It is used as a major macroeconomic indicator of any economy and used as a proxy for measuring the size and depth of the economy. GDP is the single most important measure of the health of the macroeconomic situation in every developed economy and has been the most widely reported statistic (Mankiw 2014).

There is growing disagreement among scientists and experts on GDP being used as a proxy measure for prosperity and well-being. Regardless, it is still being widely used as an economic metric and an assessment tool for society's performance (Fioramonti 2014). A study by Hill, Cheung et al. (2019) finds societies where individuals report greater life engagements tend to have higher GDP suggesting that individuals who report a greater sense of purpose in life tend to fare better economically, which may be expected to extend to the societal-level, in terms of higher GDP.

This paper intends to establish the relationship between the level of inflation and the amount of FDI received in the selected countries. The inflow of FDI is hypothesized to reduce the price level because FDI leads to an increase in goods and services and competition. FDI also increases productivity and efficiency, as suggested by the existing literature, thus leading to a reduction in production costs and keeping the price stable. So, it is hypothesized that with the FDI inflowing, there is a decrease in the price level. An awareness of the implications of such a relationship, if any, is essential for the relevant authorities, in terms of both macroeconomic policy and decision-making.

The remaining part of the paper is organized as follows: The second section discusses various existing literature on the relationship between Inflation and FDI. The third section describes the data and variables used in the study. The fourth section explains model specification and methodology. The fifth section includes the study's findings and results. Finally, the sixth and last section concludes the paper with recommendations.

Literature Review

There is various literatures on FDI and its relationship with GDP, Investment, Domestic Capital, Productivity and Efficiency, economic growth and development, Poverty reduction, energy consumption, inflation, etc. This section of the paper will discuss some of them.

By analyzing the association between FDI and GDP, Sengupta and Puri (2018) finds FDI a significant contributor to GDP. The author states that FDI plays a vital role by acting as a source of capital and increasing the competitiveness of the domestic economy. Similar conclusions have been drawn in other studies. Verma (2020), Asghar et al. (2012) suggests that there is strong relationship between FDI and GDP in the countries of concern.

On part of economic growth, Agrawal (2015) indicates that FDI has a positive long-run association with Economic growth. Author recommends encouraging the potential sources of economic development which would simulate and enhance foreign investments. Although the coefficients are in negative for short-run estimates, there is a positive relationship between FDI and Economic growth (COBAN and YUSSIF 2019). Similarly, Zekarias (2016) conforms the positive and marginally significant effect of FDI on economic growth suggesting FDI as a key driver of economic growth and catalyst to economic conditional convergence in Eastern Africa.

However, studies have shown that there exists none as well as negative relationship among FDI and Economic growth. Kaur (2013) concludes that FDI inflows do not have positive relationship with growth indicators. By

examining the effectiveness of FDI on Economic growth in the sample countries, the study finds that there exists ineffectual role of FDI in promoting Economic growth (Basnet and Pradhan 2014). The authors suggest that countries at initial phase of the development may lack the absorptive capacities required to exert a perceptible effect on economic growth. Also, the author points out to importance of the size of the FDI inflow in the host country.

Studies have found that FDI also influences the productivity and efficiency of the factors of the host country. Papaioannou and Dimelis (2019) suggest that FDI exerts important influence on total factor productivity growth. The authors suggest that with lower regulation in upstream industries the competition enhances thus ensuring a higher level of efficiency through the reallocation of markets shares to most productive businesses. Authors recommend introducing policies that reduce entry barriers to new firms and ensure a lower level of government intervention through lower price controls and less state presence.

FDI tends to have spillover effects in the technical efficiency from the foreign firms to domestic firms. The spillover benefits accrue to the Domestic Firms primarily through demonstration effect. Sur and Nandy (2018) finds that MNCs are the prime transmitters of advanced technology as their operations have significant spillover effects to Domestic Firms and demonstration effect proves to be an important channel and source of technological externalities to the local firms in the Indian automobile sector.

Inflation erodes the purchasing power of individuals, creating distortions in the net returns of investment and labor. Foregone utility in period t reflects the cost of investing that period. Whereas the benefit is reflected in increased consumption. During this period inflation erodes the purchasing power of earnings before they are converted into consumption; thus, the net benefit of investing falls as inflation rises. This mechanism captures the direct negative effect of foreign domestic inflation on foreign domestic investment (Sayek 2009).

Sayek (1999)finds that increase in inflation reduces the FDI inflow in the economies of concern. Other literatures Valli and Masih (2014)by analyzing the time-series data from 1970-2012 establishes the long-run relationship between the level of inflation and the FDI receipt of South Africa. Similar conclusion has been drawn in the case of Ghana. The high inflation in the Ghanian economy deters the foreign direct investment (COBAN and YUSSIF 2019).

After the extensive review of the existing literatures, the need for assessing the consequence of FDI inflow on the inflation was felt. There is dearth of literature on this respect. Hossain (2018) attempted to test the role of FDI in decreasing the level of inflation of Bangladesh by applying the ARDL and NARDL with the help of time-series data from 1973-2017. But, analysis on more diverse characteristics country with a little higher number of observation would help to establish more robust causality among the variables of concern.

This paper attempts to fulfill that gap by including more number of observation over the long period of time with diverse characterstics country. So, the longitudinal/cross-country time-series data was prepared for the purpose of the analysis.

Data and Methodology

The paper studies the relationship across the four different variables; namely, Inflation, FDI, GDP and the Population. The data are sourced from the World Bank. The data were log-transformed for the purpose of the analysis. STATA 17.0 was used for the data analysis. The list of countries selected for the analysis is attached in *Appendix A.*

Summary Statistics

The Summary Statistics of observations, mean, minimum, maximum, standard deviation, skewness and kurtosis explains the synopsis about the distribution, variability and central tendency of the variables.

Table 1: Summary Statistics of the variables

Variable	Mean	Std. dev.	Min	Max	Observations
INF overall	1.701	1.213	-4.791	9.372	N = 3627
between		0.592	0.801	2.865	n = 52
within		1.066	-3.894	8.893	T-bar = 69.75
FDI overall	19.929	2.93	6.908	27.322	N = 3627
between		1.51	17.251	21.802	n = 52
within		2.529	7.219	26.163	T-bar = 69.75
GDP overall	24.376	2.278	17.346	30.78	N = 3627
between		0.809	22.592	25.658	n = 52
within		2.14	18.337	30.046	T-bar = 69.75
POP overall	16.382	1.64	11.471	21.065	N = 3627

between	0.208	16.017	16.908	n = 52
within	1.628	11.185	20.892	T-bar = 69.75

Correlation Matrix

The correlation matrix of Table 3 shows that there is a negative correlation between the Inflation and the FDI and GDP. While Inflation is directly affected by Population.

Table 2: Correlation matrix of the variables

	GDP	FDI	POP	INF
GDP	1.000			
FDI	0.830***	1.000		
POP	0.698***	0.439***	1.000	
INF	-0.246***	-0.345***	0.063**	1.000

Model Specification

This paper aims to explore the causality between the inflation with FDI, controlling for GDP and the Population. Inflation is the dependent variable explained by FDI. GDP and Population is employed as the control variables. Aiming for the objective, it has employed the following functional model based on the different Panel data literature.

The specified model is as follows:

$$Inf = f \ (FDI, GDP, Popn) \ .... \ (1)$$

Where,

Inf = Inflation (measured in terms of CPI)
FDI = Foreign Direct Investment
GDP = Gross Domestic Product
Popn = Population

The functional form explains that Inflation is dependent on or influenced by FDI, GDP and the Popn.

The model is presented as follows:

$$Inf_{i,t} = \beta_0 + \beta_1 FDI_{i,t} + \beta_2 GDP_{i,t} + \beta_3 Popn_{i,t} + \mu_{i,t} \ .... \ (2)$$

Where,

- β_0 = intercept ($\beta_0 > 0$),
- β_1 is the coefficient of Foreign Direct Investment
- β_2 is the coefficient of Gross Domestic Product
- β_3 is the coefficient of Population
- μ_{it} is the error term
- i is the country index
- t = time period

Description of the Variables

The detail of the entire variables used in the formulation of equation (1) and (2) and other associated variables in the study are presented in the below:

Table 3: Variable Details

Variable	Variable Details
Inf	Inflation (measured in terms of CPI)
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
Popn	Population

Methodology

The data were analyzed with the help of Stata. Breusch-Pagan Lagrange multiplier (LM) test (Breusch and Pagan 1980) was used to choose between the Random effects model and OLS model. Hausman Specification Test (Hausman 1978) was employed to select between the fixed effect model or random effect model.

Breusch and Pagan Lagrangian multiplier test

The pool-ability test confirms if the cross-sectional unit in the panel has the same intercept or a different intercept. Also, it should have different slopes. After employing the Breusch and Pagan Lagrangian multiplier test to test the pool ability of data, it was confirmed that the Panel data was not Pool-able. So, Pooled OLS is not appropriate for the model.

The result of the Breusch and Pagan Lagrange Multiplier test is in *Appendix B*.

Since the result indicates that Prob > chibar2 = 0.0000 and we conclude that the Pooled OLS model is not appropriate.

The Hausman Specification test

To choose among the fixed effect model and random effect model, the Hausman Specification test was conducted. The Hausman Specification Test for our model suggests that the fixed effect model is appropriate for our data. The corresponding chi-square value of the Hausman test was 121.781, and the adjoint probability was much less than 0.05.

The result obtained for the Hausman Specification test is in the *Appendix C*

Here, the null hypothesis is that the Random effect is suitable. But since the difference in coefficients is not systematic. Also the p-value is very less we reject the null hypothesis. So, we prefer the fixed effect model over the random effect model.

Results and Discussion

The paper employs the Fixed Effect model to assess the relationship between the inflation and the explanatory and the control variables in the selected countries. The model investigates the association between the Inflation, FDI, GDP and the Population. Inflation was taken as the dependent variable and FDI was taken as the independent variable while GDP and Population was controlled for. The regression result in the Table 4 shows that the Inflation is negatively related to FDI.

Table 4: Pooled OLS, Fixed Effect and Random Effect Models

Models & VARIABLES	Pooled OLS Model		Fixed Effect Model		Random Effect Model	
	(1)	(2)	(3)	(4)	(5)	(6)
FDI	-0.143***	-0.115***	-0.0843***	-0.0156	-0.0933***	-0.0412***
	(0.00646)	(0.0118)	(0.00691)	(0.0120)	(0.00681)	(0.0119)
GDP		-0.150***		-0.228***		-0.209***
		(0.0191)		(0.0179)		(0.0181)
Popn		0.283***		0.307***		0.302***
		(0.0165)		(0.0152)		(0.0154)
Constant	4.544***	3.027***	3.382***	2.549***	3.579***	2.689***
	(0.130)	(0.211)	(0.139)	(0.197)	(0.144)	(0.202)
Observations	3,627	3,627	3,627	3,627	3,627	3,627
R-squared	0.119	0.190	0.119	0.172	0.119	0.181
Number of year	52	52	52	52	52	52

*Note: The statistical test values are in parentheses. **, *** indicate significance at the 5%, 1% levels, respectively.*

FDI was found to have negative relationship with Inflation. As shown in Columns (1), (3) and (5), FDI had a negative effect on inflation for all 3 models. Columns (2), (4), and (6) show the regression result after introducing the control variables (i.e. GDP and Population). Based on the results, the conclusion did not change after the control variables being introduced.

This analysis starts from a parsimonious model that considers only one variable and gradually considers additional control variables. The result conforms the hypothesized expected negative signs, even after controlling for control variables. But, the outcome variable loses its significance after the control variables were considered in the Fixed Effect model (4) in Table 4. It is likely due to the annual nature of the unbalanced panel data.

The control variables in (2), (4) and (6) have high level of significance with the Inflation. GDP was negatively associated with the inflation, implying that the increase in GDP will decrease the price level. Another control variable

Population is positive and significantly related to the Inflation, suggesting that the more the population, the rising price level.

In all 3 models, we accept the result from the Fixed Effect Model, i.e. (3) for the relationship without the control variables and (4) for controlling GDP and the Population.

Conclusion

This examines the consequences of FDI on inflation. For this purpose, the unbalanced panel data of 88 countries from 1970 to 2021 was employed. The empirical results have been estimated using Pooled OLS, Fixed Effect, and Random Effect Models. Moreover, control variables GDP and Population were introduced to strengthen the causal conclusion.

The empirical result confirms the expected negative association between FDI inflow and Inflation. In all the models (Pooled OLS, Fixed Effect and Random Effect) employed for regression, with and without control variables, there is a negative effect on the Inflation explained by the FDI inflow. The result implies that when there is increase in the FDI inflow, the price level decreases. Using this result, we conform with the earlier proposition in the paper that with an increase in the FDI, there is a reduction in the price levels because FDI leads to an increase in goods and services and competition. It was also hypothesized that FDI by increasing productivity and efficiency reduce the production costs and keep the price stable. So, with the FDI inflowing, there is decrease in the price level.

The econometric model (2), (4) and (6) controls for GDP and Population to further enhance the presence of causality of FDI in the inflation. However, introducing the control variables did not change the conclusion in all 3 models employed. The relationship between the control variable GDP suggests that when the GDP increases, the inflation lowers. Since, GDP is a measure of the goods and service produced, the increase in supply of the goods/s leads to decrease in the price.

Another control variable population however depicted positive association with inflation, meaning that when population increases, the inflation also increases. Demographic change directly alters the size of the labor force, consumption and savings patterns and labor productivity, having an important impact on real economic variables. The population plays a demand side role in an economy, it is evident that when the demand increases, the price level also increases.

Thus, the findings of the paper correspond to the basic microeconomic foundations of the economic theories which establishes the relationship between the inflation and the FDI. So, it becomes crucial to draft the policies keeping the variables of concern in the center and analyzing the potential consequences the policies could have on the concerned variables. It is inconceivable to ignore the FDI and its consequences on the real sector of the host country as well as home country. So, policymakers, while drafting the Fiscal and Monetary policy, should bring the matter of FDI into the discussion and create space in the policies to accommodate its effects and vice-versa.

References

Acemoglu, D., et al. (2014). Institutions, human capital, and development. *Annual Review of Economics, 6*, 875–912.

Agrawal, G. (2015). Foreign direct investment and economic growth in BRICS economies: A panel data analysis. *Journal of Economics, Business and Management, 3*, 421-424.

Al-Shammari, N., & M. Al-Sabaey (2012). Inflation sources across developed and developing countries:panel approach. *International Business & Economics Research Journal, 11*, 185-194.

Asghar, N., Nasreen, S., & Rehman, H.U. (2012). Relationship between FDI and economic growth in selected Asian countries: a panel data analysis. *Review of Economics and Finance, 2*, 84-96.

Basnet, H. C. and G. Pradhan (2014). "Does the Inflow of FDI Stock Matter? Evidence from SAARC Countries." *Economic Papers, 33*, 305-312.

Bergh, J. C. J. M. v. d. (2007). *Abolishing GDP.* Tinbergen Institute.

Bernanke, B. S. (2007). Ben S Bernanke Inflation expectations and inflation forecasting.pdf. Cambridge, Massachusetts, *National Bureau of Economic Research Summer Institute*: 9.

Blinder, l. S. (1982). The anatomy of double-digit inflation in 1970s.pdf. inflation: causes and effects. *R. E. Hall. Chicago, University of Chicago Press.*

Breusch, T. S., & A. R. Pagan (1980). The lagrange multiplier test and its applications to model specification in econometrics. *The Review of Economic Studies, 47*(1), 239-253.

Callen, T. (2008). *What Is Gross Domestic Product*? International Monetary Fund.

Coban, O., & Yussif, A.-R. B. (2019). Relationships between economic growth, foreign direct investment and inflation: ardl models approach for the case of Ghana. *Eurasian Research Journal, 1*(2).

Dam, A. V. (1976). Population versus prosperity?" *International Studies, 15*(2), 287-294.

Domar, E. (1946). Capital expansion, rate of growth, and employment. *Econometrica, 14*(2), 137–147.

Domar, E. D. (1950). The effect of foreign investment on the balance of payments. *The American Economic Review 40*, 23.

Emeru, G. M. (2020). The determinants of inflation in ethiopia: a multivariate time series analysis. *Journal of Economics and Sustainable Development, 11*(21), 10.

Fioramonti, L. (2014). *How numbers rule the world the Use and Abuse of Statistics in Global Politics*, Zed Books.

Ganic, M. (2019). Does foreign direct investment (FDI) contribute to poverty reduction? empirical evidence from Central European and Western Balkan Countries. *Scientific Annuals of Economics and Business, 66*, 15–27.

Grier, K. B., & Grier, R. (2006). On the real effects of inflation and inflation uncertainty in Mexico. *Journal of Development Economics, 80*, 22.

Harrod, R. F. (1939). An essay in dynamic theory. *Economic Journal, 49*(193), 14–33.

Hausman, J. A. (1978). Specification tests in econometrics. *Econometrica, 46*(6), 1251-1271.

Hill, P. L., et al. (2019). Life engagement is associated with higher GDP among societies. *Journal of Research in Personality, 78*, 210–214.

Hossain, S. A. M., Mansur (2018). Is the relationship between FDI and inflation nonlinear and asymmetric? new evidence from NARDL approach. *Munich Personal RePEc Archive. Kuala Lumpur, Malaysia.* 112549.

Ikani, A. (1989). The dynamics of inflation in Iran. *Middle Eastern Studies 25*(Jan), 4.

Kaur, J. (2013). FDI and Sustainabledevelopment: Lessons to Draw for India. *Annual Research Journal of Symbiosis Centre for Management Studies*, *1*, 56–68.

Kaushal, L. A. (2022). Institutional and economic determinants of Indian OFDI. *Cogent Economics & Finance, 10*, 29.

Kutan, A. M., & VuksˇIc´, G. (2007). Foreign direct investment and export performance: empirical evidence. *Comparative Economic Studies, 49*, 430-445.

Lenka, S. K., & Sharma, P. (2014). FDI as a main determinant of economic growth: a panel data analysis. *Annual Research Journal of Symbiosis Centre for Management Studies, 1*, 84-97.

Lewis, W. A. (1954). Economic development with unlimited supplies of labour. *The Manchester Schoo,l 22*(2), 139–191.

Lucas, R. E. (1988). On the mechanics of Economic Development. *Journal of Monetary Economics, 22*, 3-42.

Mankiw, G. K. (2014). *Principles of macroeconomics*, USA: Cengage Learning.

OECD (2008). O*ECD Benchmark Definition of Foreign Direct Investment 254.*

Öner, C. (2012). Inflation: Prices on the Rise. *FINANCE & DEVELOPMENT*. I. M. Fund.

ONS (2022). UK Inflation rate.

Papaioannou, S., & Dimelis, S. (2019). Does FDI increase productivity? The role of regulation in upstream industries. *The World Economy, 42*(4), 1012-1031.

Peterson, E. W. F. (2017). The Role of population in economic growth. *Sage open*, 1-15.

Qin, Z., & Ozturk, I. (2021). Renewable and non-renewable energy consumption in BRICS: Assessing the dynamic linkage between foreign capital inflows and energy consumption. *Energies, 14*(10), 2974.

Ricardo, D. (1904). Theory of Value. *The Quarterly Journal of Economics, 18*(4), 455-491.

Rivera-Batiz, L. A., & Romer, P. M. (1991). Economic integration and endogenous growth. *Quarterly Journal of Economics* CVI, *106*(2), 531–555.

Roger W. Ferguson, J. (2005). *FRB_ Speech, Ferguson--Monetary Credibility, Inflation, and Economic Growth-- November 3, 2005. . Washington, DC, Cato Institute 23rd Annual Monetary Conference*

Rostow, W. W. (1959). The Stages of economic growth. *The Economic History Review, New Series, 12*(1), 1-16.

Sattar, A., et al. (2022). Impact of foreign direct investment on socioeconomic development in belt and road countries. *Cogent Economics & Finance, 10*, 1-27.

Sayek, S. (1999). *Foreign direct investment and inflation: theory and evidence.* Department of Economics in the Graduate School, Duke University.

Sayek, S. (2009). Foreign direct investment and inflation. *Southern Economic Journal, 76*(2), 419–443.

Sengupta, P., & Puri, R. (2018). Exploration of relationship Between FDI and GDP: A Comparison between India and Its Neighbouring Countries. *Global Business Review, 21*, 1-17.

Smith, A. (1776). *An Inquiry Into the Nature and Causes of the Wealth of Nations.*

Startseite, S. B. (2022). *Inflation rate at +10.4% in October 2022 -* German Federal Statistical Office.

Statistics, U. B. O. L. (2022). *US Inflation SeriesReport-20221110215323_09c95c. CPI for All Urban Consumers (CPI-U).* U. B. O. L. STATISTICS. Washington, DC.

Sur, A., & Nandy, A. (2018). FDI, technical efficiency and spillovers: Evidence from Indian automobile industry. *Cogent Economics & Finance, 6*(1).

Valli, M., & Masih, M. (2014). Is there any causality between inflation and FDI in an 'inflation targeting' regime? Evidence from South Africa. *Munich Personal RePEc Archiv.* 60236.

Verma, D. (2020). Impact of FDI on GDP per capita, trade and inflation: evidence from four emerging economies. *International Journal for Research in Applied Science & Engineering Technology, 8*(6), 956-961.

Zekarias, S. M. (2016). The Impact of foreign direct investment (FDI) on economic growth in eastern Africa: Evidence from panel data analysis. *Applied Economics and Finance, 3*(1).

Appendices

Appendix A

Algeria	Burundi	Denmark	Guatemala	Jamaica	Morocco	Peru	Sweden
Australia	Cambodia	Dominican Republic	Guinea-Bissau	Japan	Nepal	Portugal	Thailand
Austria	Cameroon	Ecuador	Honduras	Kenya	Netherlands	Rwanda	Togo
Bangladesh	Canada	Egypt, Arab Rep.	Hong Kong SAR, China	Korea, Rep.	New Zealand	Saudi Arabia	Tonga
Barbados	Chad	El Salvador	Iceland	Lesotho	Nicaragua	Senegal	Tunisia
Belgium	Chile	Finland	India	Madagascar	Niger	Sierra Leone	Turkiye
Benin	Colombia	France	Indonesia	Malaysia	Nigeria	Singapore	Uganda
Bolivia	Congo, Rep.	Gambia, The	Iran, Islamic Rep.	Mali	Norway	South Africa	United Kingdom
Botswana	Costa Rica	Germany	Iraq	Malta	Oman	Spain	United States
Brazil	Cote d'Ivoire	Ghana	Ireland	Mauritania	Pakistan	Sri Lanka	Uruguay
Brunei Darussalam	Cyprus	Greece	Italy	Mexico	Paraguay	Sudan	Zimbabwe

Appendix B

Breusch and Pagan Lagrangian multiplier test for random effects

Inf[c_Country,t] = Xb + u[c_Country] + e[c_Country,t]

Estimated results:

Var	SD = sqrt(Var)	
Inf	1.471149	1.212909
e	.8110948	.900608
u	.3628193	.6023448

Test: Var(u) = 0

chibar2(01) = 5739.32

Prob > chibar2 =   0.0000

Appendix C

Hausman (1978) specification test

	Coef.
Chi-square test value	121.781
P-value	0

About the Journal and Manuscript Preparation Instructions

About the Journal

The Journal of Development and Administrative Studies (JODAS) is a double-blind reviewed scholarly journal devoted to publishing high-quality papers using multidisciplinary approaches with a strong emphasis on emerging issues of business, economics, management, finance, and administration since 1978 on a semi-annual basis. Its main purpose is to disseminate ideas and research findings on various socioeconomic development issues related to Nepal and other countries. It brings out scholarly research articles and other features. It intends to serve as an outlet with strong theoretical and empirical research for an intellectual forum for the communication of ideas among social scientists in Nepal and the rest of the world.

Submission Information

Interested authors are required to submit their papers with a length not exceeding 5,000 words. The papers submitted to JODAS should not have been published or be under consideration for publication elsewhere. The editorial board reserves the complete right about accepting or rejecting the received articles. The opinion expressed in the articles are those of the authors and do not necessarily reflect the views of editors or publishers. The copyright of the accepted articles is reserved by the Centre for Economic Development and Administration (CEDA), Tribhuvan University. No part of the article published in this journal should be reproduced except as provided by the law currently in force without the written consent of the centre.

Manuscript Preparation Instructions

General Guidelines

1. All manuscripts should be submitted electronically in English language to the publication section of CEDA (Email*: info@ceda.org.np)*. The soft copy must be at least in Microsoft Office (2007 Version).
2. Allow top margins of 1.25" (3.2 cm) first page and 0.75" (1.9 cm) on the following pages, bottom margin of 1.44" (3.7 cm) left margin of 0.63" (1.6 cm) and right margin of 0.63" (1.6 cm).
3. Type single-spaced text and allow for double spacing between paragraphs.
4. The paper should include: title, author's name(s), affiliation, and present address.
5. Abstract (250 words maximum), an introduction, methodology (model, materials, and methods), findings, a conclusion, and a reference.
6. Acknowledgement and information on the grants received should be given if any.
7. Important formulae, figures, and tables should be numbered consecutively throughout the manuscript.

Fonts

1. Use font type Times New Roman.
2. Use font size 14 bold for the title.
3. Use font size 12 for the author's and affiliation names and addresses.
4. Use font size 11 for the text which includes abstract, body, references and acknowledgment.

Headings

1. Major headings should be centred in the column with the first letter capital in each word.
2. Subheadings should be set in italics, bold and aligned to the left-hand margin of the column on a separate line.

Tables and Figures

1. Use font size 10.
2. The charts and graphs must be centred and the title should be at the top.
3. Number all tables and figures with Arabic numerals in the order in which the tables are first mentioned in text.
4. Capitalise captions.

End Notes

1. Endnotes should be kept to a minimum.
2. Use single spacing and font size 10.

References

References should be complete and follow the latest APA Style. For *Examples:*

Single Author

Bresnahan, T. F. (1986). Measuring spillovers from technical advance: Mainframe computers in financial services. *American Economic Review, 76*(4), 742-755.

Shrestha, P. (2020a). Status of hard and soft HR Approaches: Evidence from workplaces of Nepal. *The Batuk, 6*(2), 63–72. https://doi.org/10.3126/batuk.v6i2.34516

Shrestha, P. (2020b). Outsourcing practices: Benefits and pitfalls as perceived by professionals and managers. *Pravaha, 26*(1), 135–140. https://doi.org/10.3126/pravaha.v26i1.41868

Shrestha, P. (2022). Employee perspectives on decent work and job burnout: Evidence from Nepalese manufacturing industries. *The International Research Journal of Management Science, 7*(1), 74–84. https://doi.org/10.3126/irjms.v7i1.50629

Two Authors

Wegener, D. T., & Petty, R. E. (1994). Mood management across affective states: The hedonic contingency hypothesis. *Journal of Personality & Social Psychology, 66*, 1034-1048.

Adhikari, D.R., & Shrestha, P. (2023). Knowledge management initiatives for achieving sustainable development goal 4.7: higher education institutions' stakeholder perspectives. *Journal of Knowledge Management, 27*(4), 1109-1139. https://doi.org/10.1108/JKM-03-2022-0172.

Three to Seven Authors

Kernis, M. H., Cornell, D. P., Sun, C. R., Berry, A., Harlow, T., & Bach, J. S. (1993). There's more to self-esteem than whether it is high or low: The importance of stability of self-esteem. *Journal of Personality and Social Psychology, 65*, 1190-1204.

More Than Seven Authors

Miller, F. H., Choi, M. J., Angeli, L. L., Harland, A. A., Stamos, J. A., Thomas, S. T., . . . Rubin, L. H. (2009). Website usability for the blind and low-vision user. *Technical Communication 57*, 323-335.

Organization as Author.

American Psychological Association. (2019).

Unknown Author

Merriam-Webster's collegiate dictionary (10th ed.) (1993). Springfield, MA: Merriam-Webster.

Online document:

Author, A.A. (2009). *Title of work*. Retrieved month day, year, from source.