NEPAL'S JOURNEY TO SUSTAINABILITY: THE TRANSFORMATIVE POWER OF EDUCATION

Anuradha Gunawardena[1]

Article Info	Abstract
Keywords: Education, Sustainable Development, Nepal, Socio-economic Disparities, Sustainable Development Goals (SDGs)	Education plays a pivotal role in the pursuit of sustainable development, particularly in a country like Nepal, where socio-economic disparities and environmental challenges continue to hinder progress. This abstract explores the multifaceted relationship between education and sustainable development in the context of Nepal. It discusses how education can serve as a catalyst for addressing socio-economic disparities, promoting environmental stewardship, and achieving the Sustainable Development Goals (SDGs). By investing in quality education, Nepal can harness the potential of its youth, foster innovation, and build a more resilient society that is better equipped to tackle the complex challenges it faces.

Introduction:

Nepal, a nation nestled in the heart of the Himalayas, has long grappled with socio-economic disparities, environmental vulnerabilities, and the quest for sustainable development. Its diverse landscapes, rich cultural heritage, and burgeoning population make it a unique setting for understanding the intricate interplay between education and sustainable development. In this introductory section, we lay the groundwork for a comprehensive exploration of how education can be a driving force behind Nepal's journey towards a more sustainable future.

Sustainable development encompasses the harmonious integration of economic, social, and environmental considerations, aiming to meet the needs of the present without compromising the ability of future generations to meet their own needs. For Nepal, a nation with a complex topography and a wide array of social and environmental challenges, achieving sustainable development is a multifaceted endeavor. The nation's journey toward this goal is closely tied to its ability to harness the power of education as a force for positive change.

At its core, education empowers individuals, fosters critical thinking, and imparts knowledge and skills essential for personal growth and societal progress. In Nepal, however, access to quality education has historically been marked by disparities. These disparities often manifest as inequalities in enrollment, retention, and learning outcomes, with marginalized and underprivileged communities bearing the brunt of these educational gaps. To address this issue, the government and various stakeholders have initiated policies and programs to promote

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[1] Department of Economics, University of Colombo

equitable access to education, striving to ensure that every Nepali child has the opportunity to learn and develop to their full potential.

Education has the potential to break the cycle of poverty and inequality in Nepal. By offering marginalized communities the tools to improve their livelihoods and access better opportunities, education can help level the playing field and reduce socio-economic disparities. It can empower individuals to participate meaningfully in the workforce, fostering economic growth and social progress. Furthermore, education can serve as a potent instrument in addressing gender disparities, ensuring that women and girls have equal access to educational opportunities and are better positioned to contribute to their communities and the nation at large.

Beyond addressing socio-economic disparities, education in Nepal plays a pivotal role in environmental stewardship. The country faces various environmental challenges, including deforestation, water resource management, and the impacts of climate change. A well-informed and educated populace is better equipped to understand these challenges and adopt sustainable practices. Education can promote eco-consciousness, encouraging individuals to become stewards of their environment and advocates for sustainable resource management.

Education is also intrinsically linked to the Sustainable Development Goals (SDGs), a universal call to action to end poverty, protect the planet, and ensure prosperity for all by 2030. Nepal, as a signatory to the SDGs, must leverage education to attain these global targets. From improving access to quality education (SDG 4) to addressing hunger, health, and well-being (SDG 2 and 3), education is a common thread weaving through the fabric of sustainable development.

This exploration into the nexus of education and sustainable development in Nepal delves into how education can empower the nation's youth, foster innovation, and contribute to building a resilient society. By investing in education, Nepal is not only investing in its people but also paving the way for a sustainable future that transcends socio-economic disparities, nurtures environmental harmony, and aligns with the global vision of the SDGs. In the subsequent sections, we will delve deeper into the specific ways education can catalyze sustainable development in Nepal, examining the challenges, opportunities, and promising initiatives in this regard.

2. Literature Review

A number of theoretical models have attempted at explaining what determine investment in education (Becker, 1975; Mincer, 1974; Schultz, 1961). Under the human capital theory, education is primarily identified as an economic device similar to any other production factor. Hence, according to human capital theory, amount of investment is primarily determined by the rate of returns to education. According to Mincer (1974), decision to invest in human capital is similar to any other types of physical investment decisions because it can generate growth and personal well-being. As with any other investment decision, opportunity cost of engaging in studies (both forgone time, tuition and other expenses) is accepted in order to generate relatively a bigger monetary and non-monetary returns in the future. In narrower version of the human capital model, knowledge and skills are valued instrumentally, insofar as they contribute to increase productivity and hence, other things being equal, to higher earnings. However, the human capital model may be interpreted more broadly, to encompass learning that does not contribute to higher market earnings. A knowledge of, and capacity to appreciate, literature, for example, provides a future consumption stream not reflected in market earnings.

At the individual level, private return to education determines whether an additional year of schooling is a rational choice. A rational individual decides to school an additional year if the incremental income gain is bigger than that of the opportunity cost born by the individual for the additional year.

Literature on returns to education has exploded since Mincer‟s seminal work in 1974 (Mincer, 1974).Private returns to education have mostly been estimated based on the Mincer regression framework where log earnings is a linear function of years of schooling and years of work experience (Psacharapolous 1981; Psacharapolous and Patrinos, 2004; 2007; Heckman et. al. 2008). In subsequent studies, the Mincerian framework has been employed to estimate returns to education while controlling for additional labour market characteristics (Kuglerand and Psacharopoulos, 1985; Card and Krueger, 1992). Similarly, some studies have addressed the

problem of edogeneity and corrected it using family background related information through instrumental variable regression approach (Card 1993; Cameron and Taber 2004; Cameron and Heckman 1998; Cameron and Taber 2004; Devereux and Fan 2011).Moreover, recent studies have addressed the issue of selection bias arising from individuals‟ decisions on labour force participation and have extended to calculate returns to education at different places in the wage distribution (Bagheri and Kara, 2005; Li et al., 2011).

Psacharopoulos and Patrions, (2004) reviewed empirical studies prior to 2000 and highlighted few stylized fact relating to returns to education. First, private returns to education are higher than that of social returns, partly due to public funding and inability to capture entire social benefits of education. Second, returns to schooling are higher in developing countries than in developed countries. Third, social returns to primary education arehigher than that of secondary and higher level of education rationalizing more public funds to guarantee primary education opportunities for all. Fourth, average rate of private returns to another year of schooling is around 10 per cent. A few studies attempted at estimating returns to education in Nepal (Akanda, 2010; Lamichhane and Sawada, 2013, NGD, 2014). Akanda, (2010), using Nepal Living Survey 1995/96, found returns to an additional year of schooling are around 6 per cent while the NGD (2014) report, prepared by the Government of Nepal in collaboration with the USA government, found that returns to an additional year of schooling are somewhere around 13 per cent.

Both studies confined to traditional Ordinary Least Square estimates in calculating private returns to education. Lamichhane and Sawada (2013) estimated, for Nepal Living Standard Survey 2003/2004, returns to schooling for disabled workers. Addressing both the issues of endogeneity and sample selection bias, the authors found that returns to education for people with disabilities ranging from 19.4 to 33.2 per cent.

Existing studies on returns to education in Nepal largely confined to estimate returns to schooling at the mean of the wage distribution. In this study, it is expected that returns to education at different places of the wage distribution is estimated to examine to what extent, returns to schooling differ for a given education level but laying at different earning profiles. Similarly, earning function is estimated while correcting for the sample selection bias using a framework developed in recent years.

3. Econometric Strategy and Data

Econometric Specification

We estimate a variant of Mincerian equation to estimate returns to schooling while controlling for selected labour market characteristics.

$$Y_i = \delta + X_i\beta + \epsilon_i, \qquad i = 1, 2, \dots, n \qquad\qquad (1)$$

In eq. (1), Y is, log hourly wage, our dependent variable andX matrix consists of variables constructed on the basis of highest educational level completed namely; no schooling, primary, lower secondary, upper secondary, degree, postgraduate. Also X consists of other human capital variables (experience, experience square and vocational training), and some demographic variables (male and caste). Moreover, $\epsilon_i$is error term and i stands for i^{th} wage employee.

It is a well-known fact that nationally-representative samples are not selected on randombasis; rather, they are designed using stratified sampling techniques to reflect population characteristics. Hence, it is important to address the selection bias issue when estimating a behavioral relationship. Following discussion provides a brief note on the selection bias correcting approach adopted in this study. Essence of this illustration is based on Bourguignon et al.(2007, pp. 175-79).

Consider a situation in which an individual makes a choice whether to participate in the labor market where each participant may select among *j* mutually exclusive alternatives. These alternatives could be (i) economically inactive, (ii) employed, and (iii) unemployed[2]. Let Y_j^* to be the utility attainable for an individual if he/she chooses alternative *j*. We can write the indirect utility function as:

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[2] In this chapter, informal sector consists of self-employed and unpaid family workers. This is rather a narrow definition.

$$Y_j^* = Z_{\gamma j} + \epsilon_j, \qquad j = 1, 2, \dots, J, \tag{2}$$

where the matrix Z represents a set of explanatory variables affecting employment alternatives, and ϵ_j is the error term. A rational individual compares the utility attainable from each alternative and selects the alternative s that gives him the highest benefits, that is:

$$Y_s^* > \max_{j \neq s}(Y_j^*), \qquad s \in (1, 2, \dots, J) \tag{3}$$

Assume the market wage in the sth alternative is given by:

$$ln\text{w}_s = X_s \beta_s + u_s, \tag{4}$$

where X_s is a matrix of exogenous variables that determine the log wage (lnw_s), and the disturbance is a i.i.d. random variable with zero mean [$E(u_s|X,Z)=0$] and a constant variance [$Vu_s|X,Z)=\sigma_s^2$(]. If there are unobserved characteristics that affect both individuals'' choices and their earnings, it could be proved that the disturbance ϵ_j in eq. (1) and disturbance u_s in eq. (4) are correlated (Bourguignon et al., 2007).

As Hecman (1979) pointed out, the potential inconsistency requires a correction for selection bias when estimating a behavioral relationship such as eq. (1)[3]. Among them, Dubin and MaFadden (1984) (henceforth DMF) approach is popular as well as relatively superior to the other methods (Bourguignon *et al*., 2007). The DMF approach makes no assumption about the direction of the correlation and use multiple correction term to control for the self-selection in the sth alternative as related to each other alternative. Hence the correlation between u_s and $(\epsilon_j - \epsilon_s)$ could be of different signs for different j. Similarly, the DMF approach identifies not only the direction of the selection bias, but also where the bias stems from, by linking the selection bias to the allocation of individuals to each alternative. Due to these reasons, this study employs the DMF approach for selection bias correction. According to DMF method, consistent estimates that are free from sample selection could be derived by estimation eq. (5).

$$lnw_s = X_s \beta_s + \sigma_s \frac{\sqrt{6}}{\pi} \sum_{j \neq s} r_j \left[\frac{p_j \ln(p_j)}{1 - p_j} + \ln(p_s) \right] + e_s \tag{5}$$

where r_j is the correlation coefficient between disturbance u_s and ϵ_j, and e_s is a residual whose asymptotic mean is zero. Eq. (5) can be estimated in two steps. In the first-step, the polychotomous choice mode is estimated by the logit maximum likelihood method (eq. (2)). Let $\hat{p}_j$, be the predicted probabilities for p_j, $j=1,\dots,J$. In the second step, we substitute $\hat{p}_{j,}$, $j=1,\dots J$ (the selectivity correction term) into eq. (5) and we then estimate the function by OLS. Since, this involve two-step procedure, the estimated standard errors may not be efficient. To correct it one can use the weighted estimation and bootstrap procedures to obtain robust standard errors. We estimate the eq. (1) in the form of eq. (5) and use the bootstrap method for obtaining the robust standard errors.

In addition, quantile regression approach is employed in exploring the heterogeneous nature of returns to education across wage distribution. Quantile regression approach is a direct extension of the standard OLS procedure; hence, its methodology is not discussed in this paper[4].

Data and Data Transformation

We use data from the Nepal Labour Force Survey 2008 (LFS-2008) conducted by the Central *Bureau of Statistics* of Nepal. The LFS-2008 consists of 76,208 observations. We restrict our sample to non-agricultural wage employees because many agricultural wage employees in developing countries receive payments both in cash and kinds (Deshingker and Farrington, 2006)[5]. Following literature, sample is further restricted to wage employees who are in the age group of 15-65 and whose usual hours of work per week in the main occupation is

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[3] There are a number of approaches in the literatures for correcting the selection bias problem (Dahl, 2002; Dubin and MaFedden, 1984; Lee, 1983).

[4] Interested readers could refer to Koenker and Hallock (2001) for a theoretical discussion while Buchinsky (1994) for a proper empirical guide.

[5] Valuing kinds received by farmers is quite difficult given limited information on marketable values on agricultural products. [9] The literature assumes 4.2 weeks per months (Daouli, et al., 2013). Daily wages are multiplied by the no of days work for calculating monthly wages for daily wage earners.

at least 20, but not more than 70 per week (Gunawardana, 2005).The hourly wage rate is calculated by dividing the monthly wage by usual hours of work per week into average number of weeks per month[9]. Key explanatory variables in the Mincerian wage equation are the schooling and experience. We calculate number of years of schooling as well as six dummies representing the highest educational level completed by a given employee. These groups include; (a) no schooling, (b) primary, (c) lower secondary (d) upper secondary, (e) degree, and (f) postgraduate. Following literature, potential work experience of an employee is calculated by subtracting years of schooling pulse six years from his/her age (Card, 1999). Moreover, few dummy variables are created for caste (5 dummies), gender, and vocational training receipt. Finally, following Daly and Valletta (2005), using log hourly wages, the sample was trimmed, 1 per cent from both bottom and top of the wage distribution, to remove outliers.

4. Estimation and Discussion

Table 1 reports some sample characteristics. Our final sample consists of information relating 5,914 wage employees working in the non-agriculture sector in 2008. Nearly 62 per cent of total paid employees are below 35 years indicating Nepal still inherits relatively a young workforce. Similarly, just over 50 per cent of total employees belong to Chhetri, Brahaman (Hill), and Newari while around 2 per cent of the total belongs to the lowest caste called Kami. In terms of gender, male accounts for around 75 per cent and 80 per cent of employees are married.

According to Table 1, nearly 16 per cent of the total paid employees have at least a degree while around 19 per cent of the total is without formal education. Also nearly 20 per cent of the total paid employees in the non-agricultural sector have undergone some formal vocational training.

Table 1:**Sample Characteristics**

Variable	Obs.	Mean	Std. Dev.	Min	Max
Log hourly wage	5613	3.19	0.73	0.83	5.12
Years of schooling	5914	8.04	5.36	0.00	18.00
Potential experience	5914	19.67	12.58	0.00	59.00
Age	5914	33.63	11.12	15.00	65.00
Gender (Male=1)	5914	0.76	0.43	0.00	1.00
Caste					
Chchtri	5914	0.14	0.34	0.00	1.00
Brahman Hill	5914	0.18	0.39	0.00	1.00
Newar	5914	0.17	0.38	0.00	1.00
Kami	5914	0.02	0.14	0.00	1.00
Other	5914	0.49	0.50	0.00	1.00
Ethnicity (Nepalese = 1)	5914	0.98	0.14	0.00	1.00
Marital Status (Single = 1)	5914	0.21	0.41	0.00	1.00
Education Level					
No Schooling	5914	0.19	0.39	0.00	1.00
Primary	5914	0.17	0.37	0.00	1.00
Lower Secondary	5914	0.22	0.41	0.00	1.00
Upper Secondary	5914	0.27	0.44	0.00	1.00
Degree	5914	0.11	0.31	0.00	1.00
Postgraduate	5914	0.05	0.23	0.00	1.00
Vocational Training Received	5914	0.20	0.40	0.00	1.00

Source: Authors" calculation based on LFS-2008

Mincer (1974) specified a log-linear function in estimating returns to education where log wage is a linear function of no of years of schooling and potential experience and its square. This basic formulation has been extended and modified in a number of ways by addressing important concerns in subsequent years (Heckman, et al., 2003). Among them, non-linearity between wage and years of schooling has been incorporated into Mincerian function by two main ways, (a) either by introducing polynomial of schooling or (b) by introducing dummies representing different educational levels (Kharbanda, 2012). In this study, we stick to second method, where we employ five educational dummies to estimate rate of returns at different level of education.

Table 2: **Returns to Schooling in Nepal**

Dependent variable: log of hourly wages

	Model 1A	Model 1B
Constant	1.782***	0.658
	(0.056)	(0.523)
Education (years of schooling)	0.082***	0.070***
	(0.002)	(0.008)
Potential experience	0.040***	0.057***
	(0.002)	(0.012)
	-0.0004***	-
Potential experience square		0.0005***
	(0.00004) 0.070**	(0.0001)
Vocational Training (=1 if received)		0.064**
	(0.020)	(0.022)
Gender (=1 if male)	0.231***	0.534**

per cent of Elementary workers. The shares of Managers and Professionals are 2 per cent and 13 per cent respectively in the sample. It is important to note that nearly two-third of total paid employees is informal workers. In many developing countries, informal workforce account for a significant share of the workforce[10]. For instance, the share of informal workforce in Sri Lanka is around 62 per cent (DCS, 2012).

	(0.020)	(0.170)
Caste effect	Yes	Yes
R square	0.367	-
No of Observations	5613	5613
Selection bias correction terms (Multinomial logit model)		
Employed		0.242
		(0.176)
Unemployed		-4.844**
		(1.927)
Inactive		0.272
		(0.190)

Note: ** and *** denote that the estimated coefficient is statistically significant at 5% and 1% respectively. Each model was corrected for heterokedasiticity and standard errors reported in parentheses are heteroskedasticity *robust standard errors.*

Table 2 reportsthe estimated coefficients where our education variable is number of years of schooling. Model (1) in Table 2 reports estimated coefficients, using OLS procedure, before correcting for sample selection bias. Accordingly, average rate of returns to an additional year of schooling in Nepal is around 8 per cent. However,

as literature has immensely shown, this estimate could be under- or over-estimated if our sample is drawn non-randomly (Heckman, et al., 2003). Nationally representative samples, such as Labour Force Survey, are not drawn on random basis; rather, stratified sampling techniques are used to guarantee that the sample properly represents the population features. Hence, it is imperative to correct for the sample selection bias in order to avoid any over- or under-estimation with respect to estimated coefficients[6]. As outlined in the methodology section, we employed multinomial logistic framework in addressing the issue of sample selection bias and secondstage regression results along with Mill ratios attached to first-stage regression are reported under model (1B) in Table 2.

According to model 1A, the estimated coefficient of schooling is 0.08 where as in model 1B, same is 0.070. More importantly, the estimated coefficient of schooling is statistically significant in both models. The difference in magnitude suggests that the OLS has over-estimated the schooling coefficient due to sample selection bias. The estimated coefficient of schooling in model B suggests that average private returns to an additional year of schooling in Nepal are around 7 per cent. There at least two previous studies that estimated returns to education in Nepal. Akalanda (2010) estimated rate of returns to education as 6 per cent while NGD (2014) estimated it as 13 per cent. Both these studies used data from the Living Standard Survey of Nepal. Yet, Akalanda (2010) estimated based on 1995/96 LSS of Nepal while NGD (2014) utilized 2010/11 LSS of Nepal.As a result, the difference between the two estimates could be attributed to two different time period to which estimates refer. The existing differences between previous estimates and our estimate could be attributed to different data sources and time periods.

International comparison shows that the estimated average rate of returns fall in line with the estimates of the countries with similar level of income. For instance, after reviewing a number of studies published on returns to education, Psacharopoulos and Patrinos (2004) summarize that average private returns to education for low income countries are around 10.9 per cent whereas this average for Asian countries are somewhere around 9.9 per cent. Recent studies in some South Asian countries suggest that the private returns to an additional year of schooling range from 5 to 9 per cent (Kharbanda, 2012; Agrawal, 2011). Using Household Income & Expenditure Survey of 1999-2000, Asadullah (2005) found that the average private returns to an additional year of schooling in Bangladesh are around 7 per cent. A number of studies have estimated returns to education in recent years in India and, according to those estimates, the private returns to an additional year of schooling are somewhere around 7 to 9 per cent.

For instance, using employment and unemployment survey of 2004-05, Kharbanda(2012) found that private returns to an additional year of schooling are 9 per cent. Similarly, Agrawal (2011), for the data ofIndia Human Development Survey of 2005, found that the private returns are around 8 per cent. Himaz and Aturupane (2012), using Labour Force Survey data for the period of 1997-2008 and applying a pseudo-panel approach, found an additional year of schooling would increase monthly earning by around 5 per cent for males in Sri Lanka. Hence, it could be concluded that our findings are largely consistent with these global and regional estimates.

In subsequent literature, some authors have constructed the standard Mincerian wage function as a quadratic function of schooling to capture the non-linearity with respect to log earnings and schooling found in the empirical literature (Card, 1999). This non-linearity relationship could also be captured by introducing dummy variables constructed based on the highest educational level completed (Kharbanda, 2012). Adding to that, Mincer (1997) suggests that log earnings may be a convex or a concave function of schooling. Empirical work done by Deschenes (2001) suggests a rise in convexity between the log of earnings and schooling in 1980"s and 1990"s compared to 1970"s.

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[6] The bias exists due to a flaw in the sample selection process, where a subset of the data is systematically excluded due to a particular attribute. The exclusion of the subset can produce distorted results.

Table 3:**Determinants of Wages in Nepal**

Dependent variable: log of hourly wages

	Model 2A	Model 2B
Constant	1.905***	0.445
	0.057	3.011
Primary	0.192***	0.110**
	0.028	0.041
Lower secondary	0.399***	0.192**
	0.029	0.073
Upper secondary	0.823***	0.514***
	0.028	0.106
Degree	1.197***	0.750***
	0.034	0.151
Postgraduate	1.487***	0.959***
	0.04	0.184
Potential experience	0.04	0.066**
	0.002	0.022
Potential experience square	-0.0005***	-0.0007***
	0.00004	0.00007
Vocational Training (=1 if received)	0.061	0.057***
	0.019	0.018
Gender (=1 if male)	0.256***	0.503**
	0.02	0.232
Caste	Yes	Yes
R Square	0.392 -	
No of observations	5613	5613

Selection bias correction terms (Multinomial logit model)
Employed

		0.136
		0.427
Unemployed		-9.552**
		2.34
Inactive		0.796
		3.299

Note: ** and *** denote that the estimated coefficient is statistically significant at 5% and 1% respectively.Each model was corrected for heterokedasiticity issues and standard errors reported in parentheses are heteroskedasticity-*robust standard errors.*

Moreover, a number of studies have found that there is „sheepskin" effect in the job market implying that wages rises faster with extra years of education when the extra year also conveys a certificate[7].Some previous studies on rate of returns to education have overcome this issue of non-linearity by incorporating some polynomial terms for schooling while the others have introduced dummy variables representing different education level to wage function (Kharbanda, 2012).

In this study, we introduce five dummy variables to capture highest education level completed by an employee. The estimated results are reported in Table 2 where model 2A refers to OLS estimates without correcting for the sample selection bias and the estimated coefficients of model 2B are corrected for the above issue. In both models, the estimated coefficients of dummy variables representing different education levels are statistically significant at conventional level of significance.

Similarly, it could be noted that the relative size of the estimates tend to increase over higher education levels. For instance, according to model 2B, hourly wage rate of an employee completed just primary education is 11 per cent higher than that of an identical employee not schooled at all. In the labour market of Nepal, an hourly wage rate of a professional degree holder is 96 per cent higher over an identical wage employee with zero formal education. It is also clear that earning differentials are quite significant across different educational levels.

According to literature, the rate of returns to each education level could be calculated using the estimated coefficients of dummy variables representing different educational levels (Card, 1999). Table4 reports rate of returns to education calculated based on Table 2 and the information related to number of years of required schooling to complete each education level[8].

Table 4:**Returns to Education**

Education level	Model 2A'	Model 2B'
Primary	4%	2%
Lower secondary	3%	2%
Upper secondary	24%	16%
Degree	12%	8%
Postgraduate	12%	8%

Note: Returns to education for a particular education level is calculated as follows. $\tau_i = \left[(\hat{b}_i - \hat{b}_j) / \Delta Y \right] * 100$. where is the rate of return andIt''s the particular education level for which the rate of return is calculated (i> j is also assumed). In the above equation, $\hat{b}_i \ and \ \hat{b}_j$ refer to the estimated coefficients attached to educational level i and j respectively and ΔY is the distance, in years, between the two education level. Rate of returns to primary education is calculated just by dividing the estimated coefficient for primary education by the no of years required to complete it.

According to our estimates, private rate of returns to education remain relatively low for primary and secondary education (see Table 4). Nevertheless, returns to upper secondary education reach 16 per cent indicating an additional year spent for completing upper secondary education is highly rewarded in the labour market.

In contrast, returns to an additional year spent for graduate and postgraduate level education remain relatively lower than that of the higher secondary. We presume that this may partly be dueexisting labour demand conditions

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[7] This is one of the hypotheses constructed on the basis of screening theories of education. Accordingly, a certificate received after completing a certain level of schooling make a bigger impact on wages. As a result, rate of returns to an additional year of schooling are significantly higher for a „certificate year" – year in which certificated is received - than that of for a „normal schooling year" .

[8] According to Nepalese education system, no of years of schooling required to complete primary education is 5 years – from Grade 1 to Grade 5, while 5 years are required to complete lower secondary education – from Grade 6 to Grade 10. Students could complete upper secondary by schooling 2 more years – completing Grade 11 to Grade 12. In Nepal, a Bachelor degree takes 3-4 years while Master/MPhil/PhD degrees need 2-4 years.

in the economy. One possible explanation may be that the lower returns to an additional year of undergraduate and postgraduate studies are due to lower demand for such set of skills.

Given the structure of the economy of Nepal, it could be expected that demand for „advanced" skills produced by undergraduate and postgraduate studies remain relatively less attractive compared to „intermediatelevel" skills inherit in upper secondary education[9]. At least partly reflecting this low returns to undergraduate and postgraduate studies, Nepal has in recent years witnessed a significant level of brain-drain[10].

Table 5: **Returns to Education by Sub-Sample**

	Employment Sector		Employment Status		Gender	
	Public	*Private*	*Formal*	*Informal*	*Male*	*Female*
Schooling	0.075***	0.075***	0.077***	0.061***	0.077***	0.103***
	(0.004)	(0.002)	(0.003)	(0.003)	(0.002)	(0.004)
By education level						
Primary	1%	3%	1%	3%	3%	4%
Lower Secondary	1%	4%	4%	2%	4%	7%
Upper Secondary	18%	19%	17%	18%	20%	24%
Degree	13%	13%	12%	10%	13%	13%
Postgraduate	7%	14%	8%	15%	11%	14%

Note: See the information given below Table 4 for rate of returns calculation for education level.

Estimates on rate of returns to education along the line of gender, employment (private vs. public) and employment status (formal vs. informal) are reported in Table 5. Interesting, size of the estimated coefficients remain almost the same for both public and private employees. Nevertheless, rate of returns calculated for education levels reveal that, for certain categories, the returns are higher for private sector employees compared to that of public sector employees. This is especially true with respect to returns to education for postgraduate studies. One possibility for this scenario is that private sector firms pay relatively higher for attracting and keeping postgraduate qualified employees who otherwise migrate. Similarly, it is also possible that monthly wage of a senior officer in the public sector is a fraction of the entire remuneration package received.

Generally, in most developing countries including Nepal, public sector workers are entitled to many other non-monetary privileges. Pascharopoulos and Patrino (1994) found that the global averages on returns to education are higher for employees working in the private sector than that of the public sector. The estimated coefficient of schooling indicates that returns to education are higher for formal wage employees compared to that of informal employees. Park and Qu (2012), for the case of urban China, found that returns to education for an employee in the informal sector are about 4 per cent lesser than that of the employee in the formal sector. Similarly, Herrera-Idárraga *et al*. (2013) found that returns to education of informal employment are half of that of the formal employment in Colombia. Nevertheless, the returns are significantly higher for postgraduate qualified informal employees compared to an identical employees working in the formal sector. One possibility for this is that, as the literature has found, highly qualified employees could be attracted to informal employment only by paying relatively higher wage rate than paid at the formal sector. The main reason for this is the risk associated with informal labour market arrangements. Interestingly, returns to education for females are higher than that of for male. For instance, an additional year of schooling increases the hourly wage rate by 8 per cent for males while

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[9] In 2012-13, agriculture accounted for 35 percent of value-added in the GDP and Industrial value-added remained around 15 per cent (manufacturing activities accounted for 6 per cent of GDP). According to Living Standard Survey of Nepal 201213, nearly 66.5 per cent of total employed people engage in the agriculture sector.

[10] According to CBS (2014), in the 2001 census, 762,181 persons were reported to be absent. The figure went up to 1,921,494, more than doubled in 2011.

female"s hourly wage rate is increased by 10 per cent. Similarly, our estimates for education levels suggest that returns to each education level are for females than that of the male. A number of factors could explain possible reason for this behavior. First, it is possible to assume that women decide to stay in the labour market are highly productive, hence, earning more. It could be argued that chances are high that working women decide to stay at home, especially in a country like Nepal, if they are poorly paid. Hence, those who remain are the ones who are highly productive and well paid in the labour market. In that event, it is natural to expect that returns to education for females are relatively higher than that of males. Our findings are broadly consistent with that of the Pascharopoulos and Patrino (2004). Updating global patterns on returns to education, Pascharopoulos and Patrino (2004) found that, other than for the case of primary education, returns to education for female remain higher than that of males.

Figure 1: **Quantile Returns to Education (for an additional year)**
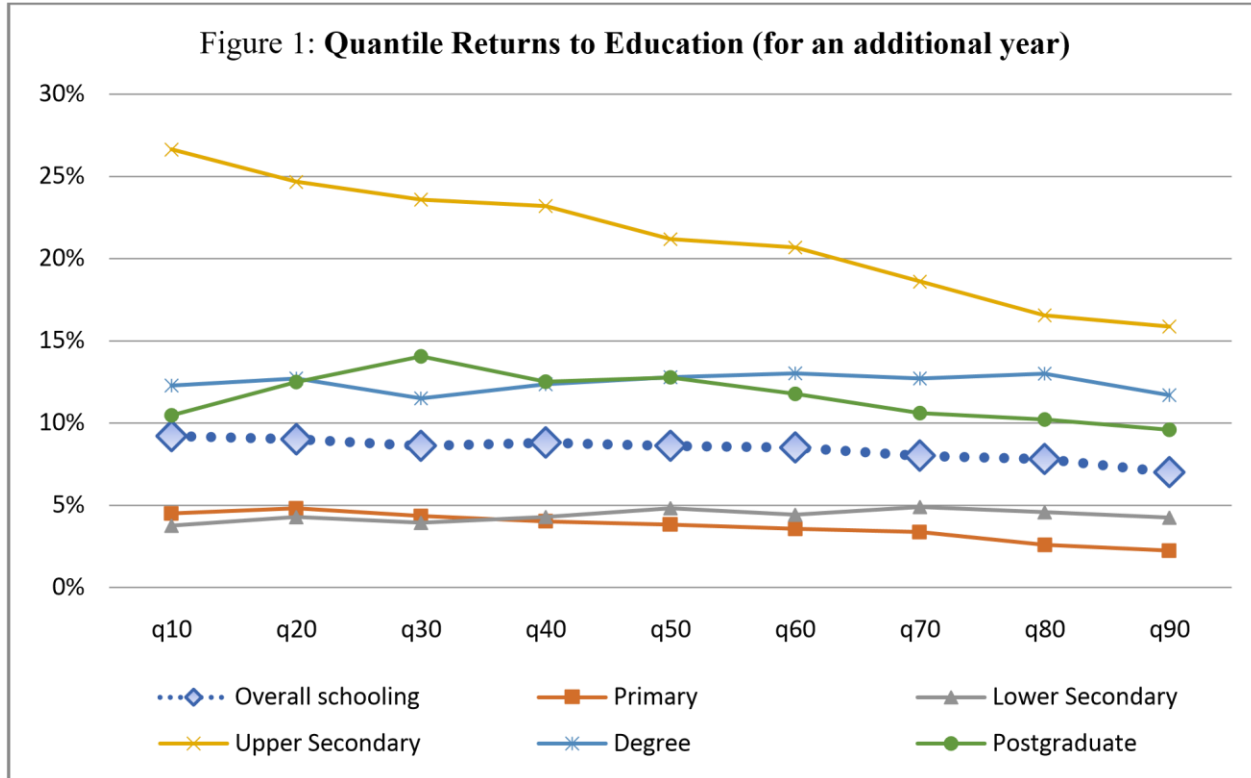
Source: Constructed based on authors" estimation.

We extend our returns to education calculation beyond Ordinary Least Square mean estimate by performing quantile regression at each decile at log hourly wage distribution. The estimated results for overall schooling variable and each education level are graphed in Figure 1. One of the reasons for this extension, as often cited in the literature, is to explore whether returns to education vary across the wage distribution (Staneva et al., 2010; Machado, and Mata, 2001). According to our estimates, returns to overall schooling as well as for education levels decline when moving to upper deciles of the log hourly wage distribution. A number of previous studies have found similar results (Staneva et al., 2010; Harmon, et al., 2010; and Fasih et al., 2012). For instance, Staneva, et al., (2010) found that returns to schooling decline reaching upper deciles in Russia.

Similarly, Harmon at al., (2010) found that, for the case of Greece and Germany, average returns to education for employees at the 90th decile are relatively lower than that of for the 10th decile of the wage distribution[11]. Interestingly, Fasih et al. (2012) found countries belonging to different continents or sub-continents show some peculiar patterns with respect to returns to education. For instance, their study found

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[11] For Greece, returns to education for 10th and 90th deciles were 6.5 and 5.4 per cent respectively in 1974. For the same country, yet for the year of 1994, these two figures were 7.5 and 5.6 per cent respectively. According to Harmon et al., (200), similar patterns could be witnessed with respect to Germany.

that returns to education increase across the wage distribution for many Latin American and African countries whereas the returns decline across the wage distribution for many Asian countries[12]. In that sense, our findings consistent with what observed in other Asian countries. However, it is imperative to undertake further research in order to determine what cause for this decline.

5. Conclusion

Education plays a key role in economic development by being an input to as well as output of development. On that basis, it has become a social ladder for millions of people living both in developed and developing countries. Especially for poor people, education is the only hope for social mobility in developing countries. One of the key determinants of investment in education is its rate of returns. Yet, this key piece of information is missing in many developing countries.

This study made an attempt to fill this gap in the context of Nepal, a low income country with poor educational attainments. We, using Labour Force Survey of Nepal (2008) and correcting for sample selection bias, estimated returns to education for overall schooling as well as for different levels of education. In addition, we also explored heterogeneity of returns to education in the labour market.

Our estimates suggest that private returns to education are around 7 per cent for an additional year of schooling in Nepal and returns are higher for upper-secondary education level compared to the other levels of education. Lower returns for undergraduate and postgraduate levels of education not only discourage student pursuing higher studies but also may have become a push factor for outmigration. Interestingly, returns to education for females remain higher than that of for the men. This piece of information suggests that parents allocate more resources for females" education. Our findings are consistent with previous studies on returns to education in Nepal as well as in other developing countries.

References

Agarwal, T. (2011), "Returns to Education in India: Some Recent Evidence", Working Paper (WP-2011-017), Indira Gandhi Institute of Development Research, Mumbai.

Akanda, M.A.S. (2010), "Returns to Education in Nepal: Evidence from Living Standard Survey", Dhaka University Journal Science, vol. 58(2), pp 257-264.

Asadullah, M. N. (2005), "The effect of class size on student achievement: evidence from Bangladesh", Applied Economics Letters, vol. 12(4), pp. 217-221.

Ashenfelter, O. and A. B. Krueger (1994), "Estimates of the Economic Return to Schooling from a New Sample of Twins", Quarterly Journal of Economics, vol. 84(5), pp. 1157-73.

Bagheri, F. and O. Kara (2005), "Rate of Return on Education and Sample Selection Bias", Atlantic Economic Journal, vol. 33(3), pp. 359-360.

Becker, G. S. (1967), Human Capital and the Personal Distribution of Income: An Analytical Approach (Woytinsky Lecture no.1. Ann Arbor: University of Michigan, Institute of Public Administration).

Becker, G. S. (1975), Human Capital (2nded.), New York: Columbia University Press.

Bourguignon, F., M. Fournier, and M. Gurgand(2007), "Selection Bias Corrections based on the Multinomial Logit Model: Monte Carlo Comparisons", Journal of Economic surveys, vol. 21, pp. 174-205.

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[12] According to Fasih et al. (2012), quantile schooling returns decline for countries such as China, Mongolia, Indonesia, Philippines, Thailand, Vietnam, and Pakistan.

Buchinsky, M. (1998), "Recent Advances in Quantile Regression Model: A Practical Guidance to Empirical Research", The Journal of Human Resources, vol. 33(1), pp. 150-210.

Cameron, S. and C. Taber (2004),"Estimation of Educational Borrowing Constraints using Returns to Schooling",Journal of Political Economy, vol. 112, pp. 132–82.

Cameron, S. and J. J. Heckman (1998), "Life Cycle Schooling and Dynamic Selection Bias: Models and Evidence for Five Cohorts of American Males",Journal of Political Economy, vol. 106, pp. 262–333.

Card, D. (1993), "using Geographic Variation in College Proximity to Estimate the Returns to Schooling", Working Paper No. 4483, National Bureau of Economic Research, accessed via http://home.cergeei.cz/gebicka/files/IV_Selection.pdf

Card, D (1999), "The Causal Effect of Schooling on Earnings," in, Orley Ashenfelter and David Card (Eds),Handbook of Labor Economics, Amsterdam: North Holland.

Card, D. and Krueger, A.B. (1992), "Does School Quality Matter? Returns to Education and the Characteristics of Public Schools in the United States", Journal of Political Economy,vol. 100, pp. 1-40.

CBS (2014), Population Monograph of Nepal 2014, Kathmandu: Central Bureau of Statistics of Nepal.

CBS(2014), Population Monograph of Nepal (Vol. 1), Kathandu: Central Bureau of Statistics, Kathmandu.

Dahl, G.B. (2002), "Mobility and the Returns to Education: Testing a Roy Model with Multiple Markets", Econometrica, vol. 70, pp. 2367–2420.

Daly, M. C. and R. G. Valleta (2005), "Inequality and Poverty in United States: the Effects of Rising Dispersion of Men's Earnings and Changing Family Behaviour", Economica, vol. 73, pp. 75-98.

Daouli J., M. Demoussis, N. Giannakopoulos, and I. Laliotis (2013), The wage curve during the great depression in Greece, mimeo

DCS (2012), Annual Survey of Labour Force of Sri Lanka - 2012, Colombo: Department of Census and Statistics of Sri Lanka.

Deschenes, O. (2001), "Unobserved Ability, Comparative Advantage, and the Rising Return to Education in the United States 1979-2000," University of California at Santa Barbara, Economics Working Paper Series, Department of Economics, UC Santa Barbara.

Deschenes, O. (2001), "Unobserved Ability, Comparative Advantage and the Rising Return to Education in the United States: A Cohort-Based Approach", Working Paper No 465, Princeton University.

Deshingkar, P. and J. Farrington (2006), Rural Labour Markets and Migration in South Asia: Evidence from India and Bangladesh, Background Paper for the World Development Report 2008.

Devereux, P. and W. Fan (2011) Earnings Returns to the British Education Expansion, Economics of Education Review, UCD Working Paper Series WP/11/11, accessed via http://www.ucd.ie/t4cms/WP11_11.pdf.

Dubin, J. A. and D. L. McFadden (1984), "An Econometric Analysis of Residential Appliance Holdings and Consumption", Econometrica, vol. 52, pp. 345-62.

Fasih, T., G. Kingdon, H. A. Patrinos, C. Sakellariou, and M. Soderbom (2012), "Heterogeneous returns to education in the labor market", Policy Research Working Paper 6170, Washington:World Bank.

Gunawardena, D. (2005), "The Gender Wage Gap in Sri Lanka", Paper presented at the 4th PEP Research Network General meeting June 13-17 2005.

Gurung, D. (2007), "Returns to Education in Nepal", Kathmandu University, Nepal (unpublished PhD thesis).

Harmon, C., H. Oosterbeek, and I. Walker (2000), "The Returns to Education: A Review of Evidence, Issues and Deficiencies in the Literature", Centrefor the Economics of Education, London School of Economics and Political Science.

Heckman, J. J. (1979), "Sample Selection Bias as a Specification Error", Econometrica, vol. 47(1), pp. 153-161.

Heckman, J., J. Lochner, and P.Todd (2006), "Earnings Functions, Rates of Return and Treatment Effects: The Mincer Equation and Beyond", in J. Heckman and E. Leamer (Eds),Handbook of Econometrics,vol. 6,pp. 307–458, Amsterdam: Elsevier

Heckman, J.; Lochner, L.; and Todd, P. (2008), "Earnings functions and rates of return", NEBR Working Paper, No.2, pp. 1–31.

Heckman, James, L. Lochner and P. Todd (2004), Fifty Years of Mincer Earnings Regressions, NBER Working Paper 9732, National Bureau of Economics Research.

Herrera-Idárraga, P.; López-Bazo, E.; and Motellón, E. (2013), "Double Penalty in Returns to Education: Informality and Educational Mismatch in the Colombian Labour market" Research Institute of Applied Economics Working Paper 2013/07, 32, Universitat de Barcelona.

Himaz, R. and H. Aturupane (2012), "Returns to Education in Sri Lanka: A Pseudo Panel Approach." University of Oxford, Queens College Discussion Paper Series: 1-18. Kharbanda, V. (2012), "Returns to Education in India", mimeo, access via

http://tippie.uiowa.edu/economics/tow/papers/kharbanda-fall2012-revised.pdf

Koenker, R. and K. Hallock (2001), "Quantile Regression: An Introduction", Journal of Economic Perspectives, vol. 15(4), pp. 143-156

Krueger, A. B. (1993), "How Computers Have Changed the Wage Structure: Evidence from Microdata, 19841989", Quarterly Journal of Economics, vol. 108 (1), pp. 33-60.

Kugler B. and Psacharopoulos, G. (1985), "Earnings and Education in Argertina: An Analysis of the Buenos Aires Household Survey", Economics of Education Review,vol. 8, pp. 353-56.

Lamichhane, K. and Y. Sawada (2013), „Disability and returns to education in developing country‟, Economics of Education Review, vol. 37, pp. 85-94.

Lee, L. (1983), "Generalized Econometric Models with Selectivity", Econometrica, vol. 51, pp. 507-12.

Li, H., P.W. Liu, and J. Zang (2011), "Estimating Returns to Education using in Urban China", Journal of Development Economics, vol. 97, pp. 294-504.

Machado, J. and J. Mata (2001), "Earning Functions in Portugal 1982-1994: Evidence from Quantile Regressions", Empirical Economics,vol. 26, pp. 115–134.

Mincer, J. (1974), Schooling, Experience, and Earnings, New York: Columbia University Press.

Ministry of Education (2010), Ministry of Education: A Glimpse 2010, Kathmandu: Ministry of Education of Nepal

Ministry of Finance (2014), Nepal Growth Diagnostic, http://mof.gov.np/ieccd/pdf/Nepal_CA_report.pdf

Park, A. and X. Qu (2012), "Returns to Education and Informal Labour Markets in Urban China: Evidence from CULS3", Institute of Population and Labor Economics, Chinese Academy of Social Sciences (IPLECASS).

Psacharapoulos, G. and H. A. Patrinos (2004), "Human Capital and Rates of Return", in Johnes, G. and Johnes, J. (eds.), International Handbook on the Economics of Education,Cheltenham:Edward Elgar.

Psacharopoulos, G. (1981), "Returns to Education: An Updated International Comparison", in Mark Blaug (ed.) The Economic Value of Education: Studies in the Economics of Education, U.K.: International Library of Critical Writings in Economics.

Psacharopoulos, G. (1994), "Returns to Investment in Education: A Global Update",World Development, vol. 22(9), pp. 1325-43

Schultz, T. W. (1961), Investment in Human Capital, American Economic Review,vol. 51, pp. l-17.

Sen, A. (1989), "Development as Capability Expansion", An especially accessible and succinct account of the capability approach to human development, Journal of Development Planning, vol. 19, pp. 41–58.

Sen, A. (2000), "Social Exclusion: Concept, Application and Scrutiny", Social Development Paper, Asian Development Bank.

Staneva, A., G. R. Arabsheibani and P. Murphy(2010), "Returns to Education in Four Transition Countries; Quantile Regression approach", Discussion paper No. 5210, IZA (Institute for Sstudy of Labour).

Tazeen, F., G. Kingdon, H. A. Patrinos, C. Salkellariou and M. Söderbom (2012), "Heterogeneous Returns to Education in the Labour Market", Policy Research Working Paper, WPS 6170, The World Bank, Human Development Network.

World Bank (2014), World Development Indicators, Washington: World Bank: