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研究課題名(和文) Impacts of Access to Infrastructure on Human and Community Development in Hilly-Mountainous Area: Evidence from Rural Nepal

研究課題名(英文) Impacts of Access to Infrastructure on Human and Community Development in Hilly-Mountainous Area: Evidence from Rural Nepal

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研究成果の概要(和文)：この研究プロジェクトの開始時には、2015年4月25日に発生したマグニチュード7.8の大地震で研究施設が破壊された。そのため、すでに設定された目標とともに、地震の社会経済的影響を調べることも目的とした。研究サイトの不利な状況にもかかわらず、計画されたすべての活動は時間通りに完了し、目的は達成されました。研究成果は、いくつかの国際会議や国別会議で発表されました。開発実践(Routledgeジャーナル)とグローバル社会福祉(Springer Natureジャーナル)の2つの論文が公開されました。研究成果は、世帯調査が実施された地方レベルでも提示された。

研究成果の概要(英文)：At the beginning of this research project, the research site was destroyed by the 7.8 magnitude earthquake on April 25, 2015. Therefore, together with the already set objective of finding out the impacts of access to various infrastructure services on human development in rural Nepal, it was also aimed to examine the socioeconomic impacts of the earthquake. Despite the adverse situation in the research site, all planned activities were completed on time, and the objectives were achieved. The research outputs were presented at some international and national conferences, two papers already published in the Development in Practice (a Routledge journal) and the Global Social Welfare (a Springer Nature journal), and several others are under publication process. The research output was also presented at the local level where the household survey was conducted.

研究分野：経済政策論

キーワード：経済政策論 統計調査 経済発展論 交通経済学 計量経済学 資源経済学

1. 研究開始当初の背景(Study Background)

(1) There are quite extensive discussions on the impact and importance of rural infrastructure on human and community development, because lack of access to basic infrastructure services undermines the inclusive development (Tanaka 2012). However, empirical works, which can demonstrate the systematic relationships between the “access to infrastructure services” and “human and community development” is quite limited (Sapkota 2014, Kusharjantoa and Kim 2011) despite well-established evidences of significant impact of infrastructure on economic growth (Samli 2011).

(2) Notably, development literature dramatically shifted from economic concentration to human focus (Todaro and Smith 2012), and 85% of global human poverty is concentrated in rural areas (Alkire et al. 2014). Furthermore, accessibility problem is severe in hilly-mountainous rural areas, where the poverty rate is highest (Shrestha 2010).

2. 研究の目的(Purpose of research)

(1) This study aimed to explore the relationships between access to basic infrastructure; such as road and electricity, on human and community development. The main purpose of this research project was to find out the impacts of access to various infrastructure services on human development in rural Nepal.

(2) In addition, the purpose of the research was broadened due the major earthquake of 7.8 magnitude that hit central Nepal in April 25, 2015 when the project was just launched. Notably, the research site is one of the hardest hit area where almost all the houses were destroyed, 17 people died, 53 people disabled and almost all people forced to live in temporary shelters for more than a year. Therefore, this study also aimed to examine the socioeconomic impacts of the earthquake.

(3) The research findings are useful for the local government agencies, policy makers, donor communities alike to use their limited resources efficiently.

3. 研究の方法(Research Method)

(1) This research followed the multidisciplinary approach and employed both quantitative and qualitative methods using the micro data that were collected in in 2016 through the household survey of randomly selected 399 households of Ramche village Sindhupalchok district,

Nepal. Table 1 shows the sample distribution by age, gender, religion, caste/ethnicity and wards of the VDC. The survey followed the third Nepal Living Standard Survey (NLSS) questionnaire with some modification to match the objectives of this study.

**Table 1.** Sample distribution by socio-demographic characteristics; n=399, 2016

	Category	%	Category	%					
Age	~39 yrs.	32	Gender	Male	71				
	40-49 yrs.	28		Female	29				
	50-59 yrs.	20	Caste / Ethnicity	Brahmin	10				
	60 yrs. ≤	20		Chhetri	47				
Religion	Hindu	71		Newar	6				
	Buddhist	23	Janajati	33					
	Kirat	3	Silpi	4					
	Others	3							
<b>Wards</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>
<b>%</b>	12	13	6	6	15	9	23	9	8

Notes: yrs. = Years

(2) Measuring poverty and inequality: The study followed the CBS (2011) to find out the poverty headcount rates that specified the national poverty line of NPR 19,261 based on the consumption data. Gini index introduced by Gini (1912) is used to measure the income inequality.

(3) Assessing subjective well-being, happiness: Oxford Happiness Questionnaire (OHQ) developed by two psychologists Hills and Argyle from Oxford University (for detail, see Hills and Argyle 1998, 2002) is used to assess subjective wellbeing or happiness of the respondent.

(4) Various quantitative methods used to analyzed the collected survey data. Particularly, following ordinary least square (OLS) regression method on the cross-sectional household data is employed.

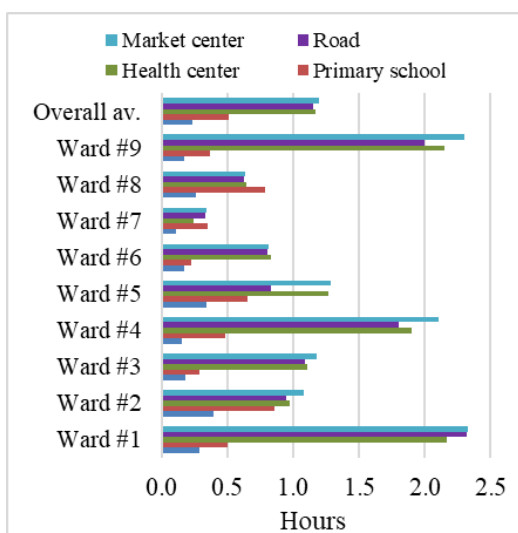
$$Y_i = \alpha + \beta_1 INFRA_i + \beta_2 C_i + \varepsilon_i$$

Where;  $Y_i$  represents the dependent variable (i.e. human/community development indicator of household/community  $i$ ).  $INFRA_i$  represents the infrastructure access related variables, such as access to road, clean water and electricity.  $C_i$  represents the vector of control variables, which include household characteristics, such as income level, educational status, employment status, ethnic identity, and household size; community characteristics, such as size of the community, and ethnic composition. Similarly,  $\varepsilon_i$  is an error term,  $\alpha$  is the constant term; and  $\beta_1$  and  $\beta_2$  are the coefficients of each explanatory variable.

#### 4 . 研究成果(Results)

(1) Status of access to infrastructure: Figure 1 shows the poor level of access to different infrastructure services. The average one-way walking time required to reach the main three infrastructure services; road, health center and market centers is more than 1 hour. Therefore, it takes more than two hours to use these infrastructures services.

**Figure 1.** Access to different infrastructure by ward (hours), 2016



Notes: One-way walking time required to reach the selected infrastructure services is reported; access to clean water source in dry season is reported.

The result also indicates that majority of the primary school students should walk more than an hour daily for their schooling. Clearly, education and health infrastructures are still far from easy reach to the village people. Drinking water collection time in the dry season is also nearly half an hour in average.

Ward no. 7 is the least remote area through where Araniko highway passes connecting the capital city Kathmandu 87 kilometers towards the South-West and the border with China, 27 kilometers towards the North.

(2) Objective well-being and the impacts of earthquake: Table 3 shows the economic, health and education status of the respondents, and impacts of the earthquake. It indicates that people tend to report less income and more consumption as average household income is reported as NPR 60,758, and average household consumption is reported as NPR 88,666. Notably, economic loss per household caused by the earthquake is recorded many times higher than the annual income, i.e., NPR 572,060. The total economic cost of

the earthquake to the whole village is estimated as NPR 379,847,509.

**Table 2.** Status of objective well-being and impacts of earthquake on it, 2016

<i>Economic status, poverty, inequality and impact of earthquake</i>						
Economic status (NPR)		Economic loss by the earthquake (NPR)		Poverty and inequality		
Average HH income	Average HH consumption	Average economic loss per HH	Total economic loss	HH below the poverty line (percent)	Gini index	
60,758	88,666	572,060	379,847,508	22	0.5	
<i>Health: disability, illness, and treatment seeking behavior (%)</i>						
HH with disable member/s	HH suffering from chronic illness	HH suffered by common illness in past 30 days	HH that could not take treatment for common illness	Human loss due to the earthquake		Av. health exp. per HH (NPR)
				No. of Deaths	No. of Disables	
43	36	40	57	17	53	19,053
<i>Education: education level of the respondents (%)</i>						
Illiterate	Literate	Basic	Secondary	College/university	Education exp. per HH (NPR)	
33	25	11	26	4	26,921	

Notes: NPR = Nepalese Rupees; Central Bank's exchange rate in 3 September 2017 was: USD1=NPR102; HH=Household; Av.=Average; exp.=Expenditure. The disaggregated statistics by wards, caste/ethnicity and other dimensions are available upon request.

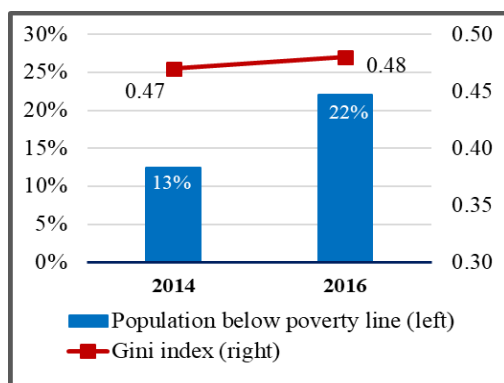
When we disaggregated the impacts, Newar ethnic group and Ward no. 7 faced the highest loss among their counterparts. Most of the losses resulted from the collapsed buildings because almost all the households were living in temporary shelters during the survey, and the village office reported that the earthquake destroyed 98% of the private and public houses including all the schools and the village office buildings.

Such a huge economic loss led additional 9% of population dragged below the poverty line from 13% in 2014 to 22% in 2016 (Figure 2). The national poverty line of NPR 19,261 (CBS 2011) was used as the cut-off line to calculate the percentage of the poor household. The poverty and inequality figures for 2014 are taken from the previous study done by Sapkota (2015). Although the sample size and the coverage of the study areas were smaller than this research, the previous study provides a reliable reference to compare the situations before and after the earthquake.

The inequality measured by the Gini index is also increased slightly after the earthquake from 0.47 to 0.48. Inequality is recorded lowest and highest with Gini index of 0.24 and 0.52 in Ward no. 6 and Ward no. 7 respectively. In health aspects,

43% respondent households have at least one disable member, 36% households have at least one chronically ill member, and 40% reported that at least one member suffered from common illness during the last 30 days. The average annual household expenditure on health care is reported as NPR 19,053.

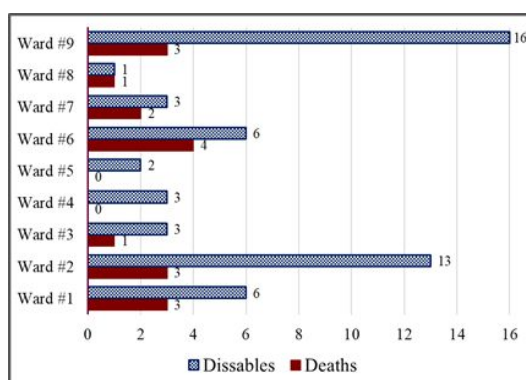
**Figure 2** Poverty and inequality before and after 2015 Nepal earthquake, 2016



Source: Poverty headcount rate and Gini index in 2014 are taken from Sapkota (2015).

As shown in Figure 3, altogether 17 people died due to the earthquake and 53 people remained disabled. The highest death of four people is reported in Ward no. 6, and 16 people injured in Ward no. 9.

**Figure 3.** The number of deaths and disables caused by 2015 Nepal earthquake by ward

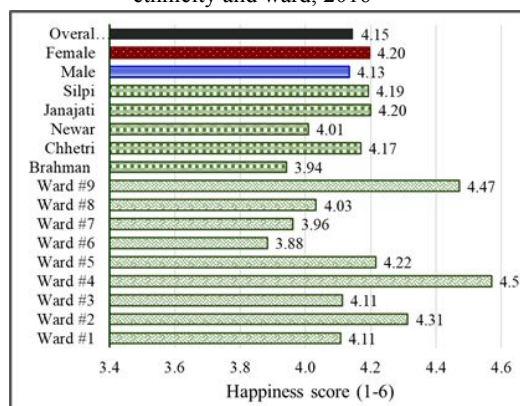


Source: The data are taken from the Ramche VDC office record that covers the whole village.

The result also shows that 33% respondents were illiterate, 25% were just literate, 11% had basic (primary) education, 26% had secondary education, and only 4% had college or university education (Table 2). The household average education expenditure was reported as NPR 26,921.

(3) Subjective well-being, happiness: Figure 4 shows the result from OHQ. Despite the massive earthquake, people in the village are found to be rather happy or pretty happy as the overall happiness score lies between 4 to 5.

**Figure 4.** Level of happiness by gender, ethnicity and ward, 2016



Notes: The happiness score is measure using Oxford Happiness Questionnaire (OHQ) which consists of 29 questions regarding feelings, satisfactions, and life evaluations to account the current level of happiness. Each question is put as a statement on a six-point Likert scale, the '1' being the unhappiest score and the '6' being the happiest score for detail see Hills& Argyle 2002).

The result shows some variation among different groups. For instance, female household heads found to be happier than male household heads. Similarly, Janajati respondents are the happiest among the caste/ethnic groups, and respondents in Ward no. 4 are the happiest among all the wards. Happiness score is recorded below four in Ward no. 6 and 7 where the earthquake caused the highest deaths and economic loss, respectively.

Similarly, the happiness score remained below 4 for the least remote Ward No. 7. The finding indicates that people having better social status and living in relatively developed areas are less satisfied in their life. It may be due to their access to information and outside society by which they can compare their life and living situation with others, especially with life in the capital city, Kathmandu, and even with lifestyle around the world.

Table 5 shows that only about 2% of the total respondents were somewhat unhappy. It indicates that people are not much passive towards their life. They did not lose their hope for the future.

**Table 3.** Grouping of respondents by happiness score, 2016

Score	Interpretation	Frequency	%
2-3	Somewhat unhappy	7	2
3-4	Not particularly happy or unhappy	137	34
4-5	Rather happy or pretty happy	223	56
5-6	Very happy	32	8
<b>Respondents</b>		<b>399</b>	<b>100</b>

Source: Interpretation is taken from S. Wright (n.d.)

Similarly, nearly 35% of the respondents were not particularly happy or unhappy.

Although these people are not particularly happy, they can be much happier if they could get some psychological support.

(4) Conclusion: In the context of limited micro research of hardest hit rural areas, this study examined the human well-being at household level in one of the most affected rural villages. The population of the village is composed of almost all the major hill's caste/ethnic groups, and all the major religions practiced in Nepal. Similarly, due to the geographical diversity, access to infrastructure is highly varied in different Wards of the village. It is, in fact, a typical rural society in the hills and mountainous areas. Thus, the findings of this study can serve as a useful reference to the other villages from hills and mountains.

The huge economic losses of more than nine folds of the average household's annual income indicates an unprecedented economic set back in the disaster hit rural areas. The earthquake pushed nearly 9% more of the village population into extreme poverty reaching 23% of total poverty headcount that puts a further challenge to achieve the number one target of United Nation's Sustainable Development Goals (SDGs) to end poverty by 2030. Thus, the government's rough estimate of the earthquake caused poverty of 2.5% to 3% of the population from the affected areas (UN Women 2016) is far from the reality. Therefore, more support is urgently needed for the basic living. More importantly, poverty rate differs significantly by wards ranging from 3% to 44%. Other subjective and objective well-being indicators also significantly differ across sociocultural and geographical groups. Hence it needs a detailed assessment of local rural areas so that the supports from government and other agencies can be better channeled to more needy people and communities. Current government support of NPR 200,000 to each of the households to build their house in the affected areas is obviously inefficient in boosting individual as well as community resilience. In fact, 38% respondents reported that their risk bearing capacity significantly declined after the earthquake. Arguably, affirmative action and wise allocation of supports to poorer and vulnerable group/s is essentially necessary to address the huge income inequality across caste/ethnicity and ward (geography) in such rural communities.

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#### [産業財産権]

出願状況(計 0 件)

取得状況(計 0 件)

#### [その他]

ホームページ等

<http://www.trios.tsukuba.ac.jp/en/researcher/0000003362>

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