

Challenges to Internet Connectivity in the Himalayan Foothills

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Understanding Internet connectivity in remote regions presents a host of logistical and methodological challenges. As researchers and business professionals, we cannot just assume that these places are simply Unconnected. We must understand the challenges people face in connecting, in what ways they have connectivity, and in what ways they do not. This paper examines research methods and framing to investigate Internet connectivity options for residents of the diverse terrain of the Himalayan foothills.

INTRODUCTION

Developing interventions to connect the two-thirds of the world that does not have Internet access is filled with technological and social challenges. It requires creativity and innovation, and thinking beyond the scope of what is canonical in developed markets to ensure that the features Internet access product will function properly at its endpoint.

In this study, we examined a remote region in the Himalayan foothills rife with technological challenges to providing affordable connectivity. The technological challenges include everything from structural hurdles – proximity to fiber backhaul, (i.e., the Internet backbone), and the expense and logistical complexity of installing and maintaining infrastructure such as cellular towers – to the technical limitations of signal propagation in mountainous terrain with intermittent power.

Even when an intervention clears the technological hurdles of broadcasting signal in a region such as this, it still needs to fit into the daily lives of those it is meant to serve. As such, understanding the human factor – not just in terms of usability, but more fundamentally in how social mores and individual perceptions will influence the adoption of this new offering – becomes inextricably linked to the potential success of any Internet access program. Understanding people who are Internet Unconnected is critical to successfully providing relevant connectivity solutions.

This paper describes the research processes by which Facebook Research sought to understand the state of connectivity in this region from the perspective of those who live there. By better understanding the people of this region, we were able to provide foundational information to the Internet.org team about how to best serve this market.

At first, the definition of “Internet Unconnected” seems like a straightforward concept (i.e., those who do not connect or have not connected to the Internet). Nonetheless, an individual's Internet-connectedness is more complicated than a binary distinction of being “Connected” or “Unconnected”. Her proximity to conversion is not simply a matter of access, but a complicated equation of access and perceived value: barriers vs. benefits. This is nicely illustrated by a few simple statistics about this region.

In the locations we examined, only 29% of people had ever used the Internet, and only 22% had used it in the past 30 days. Yet, even among this relatively “unconnected” region, nearly all (97%) people had access to a mobile phone, and 40% of people had access to phones that were internet-capable. Moreover, 3G cellular data was available in much of the region. Simply having access to a device and connectivity does not ensure that people will (or will be able to) use the Internet. Whether people are Connected is not just about physical or technical access, but also about what they perceive as the benefits of and barriers to connectivity. Access has technical preconditions, but even when those preconditions are met, other factors influence the individual's choice to go online.

Consider the story of Karin. Karin is 24 and lives in Village B with her parents-in-law and a 6 month old son. Her husband works in Delhi and visits infrequently. She does all the household work, which includes cooking three meals, all cleaning, washing utensils and clothes. In addition, she goes to the jungle to gather grass for the cows and tends the cows. She is not allowed to watch TV with her in-laws, and tells us that any free time she gets is spent on stitching her own clothes.

As a wedding present, she got her first phone, a Nokia C1, on which she only makes and receives a few calls from her family a week, and calls her husband every day. She spends about Rs.60 per month on recharging it, and is scolded by her in-laws if she exceeds that amount. Because her in-laws dislike her leaving the home outside of gathering grass for the cows, she sends someone to recharge the phone and does not go to the market herself. Her Nokia C1 is, in fact, Internet capable. While Karin has heard of the Internet and says she does not know much about it, she actually has a reasonable idea of what it can do:

“It's some ‘electric’ thing which allows you to sit at home and find out things, and talk to others. You can see the outside world through it. But I don't know what you can see. I hear about it from here and there.”

She feels using the Internet will be easy for people who know how to use it, but not for those who do not. Her perception is that mostly, villagers do not use the Internet and city people do. She believes that if she can use it, it will only benefit her and her family, and personally does not see negatives in its use.

Karin's story is a single example of how diverse and complex Internet Unconnectedness can be: familial pressure about expenditure and mobility, varying amounts of information about what the Internet is and what value it brings, dispersion of friends and relatives and a desire to connect with them, and perceptions of whom the Internet is truly “for”.

Looking at the human element in connectivity reveals that there are multiple levels of Connectedness and Unconnectedness. A survey might show Karin's access to an Internet-capable phone, and her price sensitivity. Nevertheless, the socio-cultural challenges she faced (she literally said she was not allowed to try the Internet) might not allow her to convert to Internet trial.

As researchers, and business professionals, we cannot just assume that these places are simply Unconnected as defined by statistics around phone penetration, Internet usage rates, etc. We need to understand the challenges people face in connecting, in what ways they have connectivity, and in what ways they do not.

THE BUSINESS QUESTION

In 2014, Internet.org was investigating Internet access in villages in the Himalayan foothills. At the broadest level, we researchers were charged with helping the team understand what are optimal ways of providing Internet access in different geographic locations in the Global South.

The team had several options for technical solutions to access, but needed additional context for this specific region and the people the technologies would be serving.

RESEARCH QUESTIONS

In previous Internet.org research, we had seen many additional barriers to Internet use beyond the problem of access (including sociocultural and environmental factors). Focusing solely on access would not allow opportunities to understand challenges to connectivity adoption (and without adoption, it becomes very difficult – if not impossible – to optimize technological specifications at scale).

Framing the research questions to focus on the perceptions and needs of people – understanding the local context and the local barriers to and benefits of connectivity – would allow us to create better strategy, marketing, and ultimately, product for the people we serve. Specifically, we wanted to define both the barriers and benefits to accessing the Internet in general.

We ultimately reframed the business question as a broad research question:

“What are the local barriers and benefits to adoption of Internet?”

We further articulated the main research question into a number of research sub-questions, aimed at uncovering the interplay of factors leading to Internet adoption. Leveraging a modified version of McCarthy's Marketing Mix, we proposed understanding several different elements of any potential intervention:

Who is the addressable market?

Who is immediately reachable with proposed interventions, and at what cadence (e.g., do they have a device that can connect? Do they know what the Internet is? Are they interested in the Internet?)

- Establishing where in the conversion funnel (awareness / familiarity / consideration / trial / usage) people fall to better understand where to focus product design and deployment efforts to ensure equitable access to connectivity deployment.
- Understanding structural barriers: device ownership, proximity and access to extant modes of connectivity (N.B. for the purposes of this research we focused on phones as they are the most widely distributed connectivity platform, and also are core to the designed interventions)
- Defining demographic composition (age, gender, literacy, employment, etc.)
 - Divergent rates of Internet penetration among different demographic subgroups.

- Data on gender-specific differences in device access and Internet use, and associated barriers.

What is the product market fit?

What services are already offered, as well as reception to and adoption of those services?
What might be a resonant value proposition for Internet (particularly for people who have not used Internet before)?

- Identifying Internet understanding and perceptions
- Identifying unmet needs relevant to Internet benefits

How should we promote an intervention?

The hope is always that there will be organic growth and virality of a product offering, but there is also the possibility that marketing efforts will boost organic adoption rates. In-person research could be leveraged to help the team utilize relevant language and convey what was most relevant and compelling information about the intervention and Internet.

- Revisiting the funnel: successful programs cannot just be about promoting the benefits of Internet, but must also help educate people with lower familiarity about how to actually use these services.
- Understanding how people have heard about the Internet in the past
- Measuring access to media and other communication channels to be able to optimize messaging reach

Where should we place the intervention?

Given the unique terrain and geography of the Himalayan foothills, we needed to:

- Understand where people spend their time, and in what densities
- Identify any potential challenges in universal accessibility (i.e., for all populations) related to where signal reaches

Underlying these four questions, we wanted to ask what socio-cultural conventions influence Internet usage: Are there any underlying beliefs, behaviors, or restrictions around Internet usage? Is it perceived to be beneficial to society? Are there any subgroups for whom it would not be considered beneficial? Are there any perceived risks, and if so, what are they?

RESEARCH EXECUTION

Survey Research Methodology

The survey was designed to measure the extent of technology awareness and usage in seven villages, towns, and cities in the selected region. Within each location, households were

selected via a random walk procedure, producing a sample of the household population age 15-64. Fieldwork teams used smartphones to complete interviews with 5,371 respondents. Data were collected between December 2014 and February 2015.

Ethnographic Methodology

A total of 24 in-person 1.5 hour semi-structured in-depth interviews were conducted across six different locations (varying in size from small villages to bigger towns).

Table 1. Survey & Interview Locations

City A Pop: 102,000	Town A Pop: 23,000	Town B Pop: 15,000
Village A Pop: 3,000	Village B Pop: 5,000	Village C Pop: 4,000

Recruitment parameters included:

1. Gender: 13 male, 11 female respondents
2. Age: 14 respondents 18-24 years old, 10 respondents 25-34 years old
3. Socio-economic levels: mix of socio-economic levels, excluding the highest classification (SEC A)
4. Marital status: mix of married and unmarried respondents
5. Internet-capable device access: mix of those with and without access to an Internet capable device (more than half did have access to an Internet-capable device)
6. Internet usage: a sub-selection of respondents were Internet users

We endeavored to conduct these interviews without assumptions about the desire for or reputation of Internet connectivity. In short, we never want to assume that Internet connectivity is desired. To get the fullest perspective on the potential role of the Internet for these populations, we went beyond simply asking about the Internet, and let people tell us about their everyday lives, the challenges therein, what things they would like to be able to do but currently cannot, and eventually about their thoughts on the Internet specifically.

The rough structure of the interviews included prompts about the following:

1. Respondent overview: who they are, what they do, what they hope for in life, what is important to them in life.
2. Technology overview: what technologies they currently used, what technologies exist in their village/town, how that has changed over time, what technologies they hope to have in the future.
3. Device access: what kind(s) of (Internet-capable) devices do they currently have access to, what are the device specifications.
4. Internet knowledge: awareness of the term/concept Internet, familiarity with the Internet, knowledge of how to access the Internet

5. Internet perceptions: specifically eliciting both good and bad perceptions, consideration, egocentric network usage and perceived social restrictions on Internet usage.
6. Internet usage: trial history, usage patterns (among users).

To supplement the perspective of individuals, we additionally conducted one expert interview in each of the six locations (ranging from village heads to local government-sponsored healthcare workers and educators). These expert interviews allowed us to gain a fuller perspective on the technology status and challenges of the locations we were visiting. They also allowed us to get a more general sense of what life was like in each location, beyond the limited number of interviews we were able to complete with specific individuals.

CHALLENGES IN EXECUTING THE RESEARCH

Population density & layout

This region of the Himalayan foothills has a frigid climate in the winter and a dramatically hilly landscape. The towns and villages where we conducted fieldwork often lacked a physical center, and were instead a scattering of houses and buildings on steep mountainsides, and a roadside market along a winding road. For individuals for whom cellular Internet connection is not an option, this landscape complicates the selection of centralized locations for alternative Internet connections that can be accessible to many.

Mobility and transportation

The region's generally poor state of roads, complicated by seasonal snows, mud and rockslides make physical mobility in the foothills region very challenging. In the case of this research, conducting fieldwork in early winter months meant we had limited access to potential field locations, and increased travel time to get to locations. For example, with the winding roads, which had not even yet iced over in December, it took well over four hours to travel 175 km (109 miles) in a modern passenger van, with effectively no traffic.

For residents, mobile phones were considered a lifeline for both practical uses and entertainment during these periods of limited accessibility, but respondents said that during long periods of road blocks, mobile data package top-ups wouldn't be available (because the scratch-off cards used to add mobile credit would not reach vendors).

Patrilocal habitation

In our initial imagining of the research, we wanted to speak to people in their own homes to increase levels of respondent comfort. However, over the course of conducting the interviews, we observed and were told that patrilocal habitation was common. As such, when conducting interviews with early-adult women (as our respondent set were people 18-34), we often encountered situations where the interview would be wholly observed by one or more of the respondent's parents-in-law. We found it difficult for interviewers to have

open conversations with daughters-in-law in these cases, and (on multiple occasions) received different or modified answers when parent(s)-in-law left the room.

Gender

Cultural norms about appropriate behavior for women required that we conduct ethnographic interviews with researchers of the same gender as the respondent.

Weather constraints

Conducting research in winter meant that people were not often in public spaces, and respondents needed to be interviewed indoors. Indoor in-home space constraints were challenging, and on more than one occasion the interview team did not fit into the respondent's home, or were not allowed inside. This forced us to conduct the interviews outside, which was sub-optimal for all involved, and often curtailed the duration of the interview.

Electricity blackouts, often weather-induced and accompanied by road blockages, were so frequent that respondents interviewed in a pitch-black room during a blackout blithely responded that “there are no electricity problems here.”

FINDINGS FROM THE BASELINE QUAL AND QUANT

Addressable Market

Most people have never used the Internet

Roughly seven-in-ten people have never used the Internet (71%).

Awareness is high, but familiarity is low.

While roughly three-quarters (73%) of the surveyed population had heard of the Internet, only one-third (33%) of the surveyed population felt that they knew more about the Internet than just the name.

Interest in using the Internet is not a given.

Among those who were aware of the Internet, but had never used it, only 18% said that they would be interested in using the Internet. This contrast is strikingly low compared to other countries where we have administered the same survey.

Table 1. Cross-Country Comparison of Internet Awareness, Penetration, Interest

Market	Internet Awareness	Internet Penetration	Internet Interest †
Himalayan Foothills	73%	29%	18%
Guatemala	60%	30%	34%
Kenya	70%	24%	57%

† Among non-users aware of the Internet

Not everyone who could access the Internet does

Fatima (City A) used to use the Internet regularly through her father's Samsung Android phone and the local Internet café. At some point, however, she was disallowed from using it by her parents who asked her to concentrate on her studies and housework instead. Karin (Village B, whose story we discussed in the Introduction) has an Internet-capable phone, and is interested in using the Internet, but faces pressures from her in-laws about her phone behavior and expenditures.

While the survey data provided evidence that there is a gap between those who theoretically could use the Internet and those who do, the ethnographic data allowed us to generate hypotheses about the reasons behind why people had not adopted the Internet, and understand how, if, and when to address those reasons.

Product Market Fit

Resonant Value Proposition(s)

Another consistent theme was that people less familiar with the Internet did not have knowledge or understanding of the value of the Internet. Accordingly, making sure to communicate relevant and resonant value for the people considering using the Internet became one of the highlights from our research findings. These value propositions included:

1. Providing/supplementing educational benefits for children and adults

Moderator: "What are the other places where Internet can be used and of benefit?"

Respondent: "In our village the main place where it would benefit more is the education field ..."

(Saeeda / Leena, Non-Users Interview, Village C)

"I have also seen that abroad, even a small child gets a lot of knowledge about the Internet, laptop and mobile. Even they study there on a laptop. But here we don't have all that ... the education that is given to the children here is not as great as what it should be ... [W]e need to improve the education system here. We need to change everything ... Children should learn on the laptop."

(Fatima, Non-User, City A)

2. Reducing travel: Due to the inaccessibility of the location, traveling to submit forms or conduct business is challenging. The Internet offers an opportunity to reduce the functional and temporal costs of travel.

"We can also get the information regarding the posting for our work and the details about the last date for the submission of forms and all such things, so it is good to have internet connection..."

(Saeeda, Non-User, Village C)

3. Connecting to other people (particularly outside of the town/village): due to the trend of emigration, staying in touch with friends and family who have left the region to seek employment were important to respondents.

Desired connectivity features

Those familiar with the Internet were able to identify current connectivity challenges and offer proposals for what they would like to improve or alternatively have. These features included:

1. Faster and/or more reliable connection than current Internet service offerings in the locations.

“Connectivity is not smooth here. Therefore, they face so many difficulties. And I think particularly in the time of rainy season.”

(Village C, Lecturer, Expert Interview)

“I have Internet on my phone, but I go [to the Internet shop] at times in case I don’t have network connectivity, because they have Wi-Fi over there ... Wi-Fi helps me access Internet faster.”

(Reza, Internet User, Town B)

2. Good value (more data or faster speed) for money

“[The Internet] is quite expensive which is why not everyone can afford it. I can take out some time to learn something if required. But when I go there, the money they charge is too high.”

(Fatima, Non-User, City A)

3. Need for “easy” access —no codes, passwords, other hurdles to actually getting into the service itself

“In phone you can get better Internet, and whereas Wi-Fi it is a bit difficult it’s a bit tricky one, you have to connect to the connection and then you need to enter the codes and then Wi-Fi gets access.”

(Satya, User, City A)

4. Needs to work without consistent electricity

“Also, when there is electricity we can watch TV or read but when there is no electricity then we are helpless.”

(Saeeda / Leena, Non-Users Interview, Village C)

Marketing & Promotion

Harkening back to the conversion funnel, while many people had heard of the Internet before, less than half of those aware felt as if they knew more about the Internet than just the name. Through the ethnographies, we came to understand that the varying assessments of what the Internet is often had kernels of truth to them, but still contained hefty doses of mythos or inaccurate information. As such, we counseled that any intervention needed to educate people about how to connect, not just contain messaging around awareness and appeal.

The survey data additionally revealed differences between demographic subgroups in rates of awareness usage. Interviews highlighted instances where respondents believed that the Internet was for people who were “smarter” or “lived in cities”. Marketing efforts are uniquely positioned to create an inclusive portrayal of Internet usage by ensuring a diverse representation in marketing materials to address gaps in access and perceptions (e.g., gender, age, socio-economic levels).

Product Placement

Conducting this research also allowed us to provide insight about where people might be able to (or want to) access the Internet. For the purposes of this paper, we will talk about two types of access: fixed-location and geographically-pervasive access. Each type of solution inherently comes with its own benefits and challenges, and we were able to uncover some of those that are unique to this specific environment.

Fixed-location solutions (e.g., cyber-cafes, Wi-Fi hotspots)

1. Due to the terrain, weather, as well as the dispersion of residents, in several of the locations we visited, there was no “town center”. In cases where there was a town center, it was not particularly inhabited. The lack of centralized gathering points create additional challenges for range-limited interventions in terms of addressable market, as well as marketing challenges in terms of marketing reach.
2. Women in this region described limitations on their mobility (e.g., not being able to freely leave their home). If fixed-location solutions are to be deployed and accessible to all, it is imperative that they be locations that are safe locations for women (to be in public).

Geographically-pervasive solutions (e.g., cellular data networks)

As discussed earlier, the cellular technologies are widely available but it is challenging to deploy strong, reliable signal due to the terrain. A solution that would improve signal reliability and strength is something for which residents who use the Internet state a strong desire.

NOTES

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