



NSET
Earthquake Safe Communities in Nepal

Implementing the National Building Code in Municipalities

Changing Mindsets: **Constructing Safer Houses**

2020



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Forewords (from Executive Director)

Background

With the view to encourage effective compliance to, and enforcement of, the National Building Code, National Society for Earthquake Technology-Nepal (NSET) implemented the Building Code Implementation (BCIPN) in 30 Municipalities across the country. Under the BCIPN, many activities were conducted such as training, awareness activities, orientation, symposium, seminars, education tours, surveys, earthquake scenarios and exhibitions. These activities served to enhance capacity of local Social Mobilizers, political party representatives, Ward Representatives, Women Health Volunteers, parent's groups, Local Disaster Management Committees and various organizations. In this booklet, we cover the success stories of stakeholders including construction workers, contractors, technicians, and house owners, suppliers of construction materials, business owners, concerned authorities and organizations. We will share experiences how they benefited from the program and able to increase their skill and the positive impacts they felt on their personal and professional life. All these stories and cases have been compiled collected through direct meetings and interviews with stakeholders.

“If you do not tell the truth about yourself you cannot tell it about other people.”
- Virginia Woolf

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Teej song, a medium for spreading awareness on earthquake risks, building code



Tanka Maya Gyanwali
Social Worker,
Bharatpur

Tanka Maya Gyanwali, who hails from ward no. 10 of Bharatpur Metropolitan City, is a passionate social worker. She is engaged in social services as a Female Health Worker since 2057 B.S.. Her work is well supported and appreciated by others female workers influencing them to work in the community.

Being a Female Health Worker, her job is to visit door-to-door of their locality with the view to promote knowledge, increase awareness through different means like rallies, street dramas, symposiums, trainings, pamphleting, and various competitions like singing and dancing among others. With the view to promote awareness by the help of social mobilizers, Bharatpur Municipality has been working in different sectors like health, education and the child rights.

Bharatpur municipality is one of the municipalities which has been implementing a BCIPN program in coordination with NSET. As a part of promoting awareness on the building code compliance and earthquake risks and its impact, the municipality organized a singing competition organized on the auspicious occasion of Teej festival where almost 90 female health workers from 14 wards had participated. A group of 7 female health

workers representing ward no 10 composed lyrics of the song covering the impact of earthquakes occurred in Nepal in 1990 B.S. and 2045 B.S along with the earthquakes occurred in Chile and Haiti. The song also covered messages regarding earthquake mitigation measures and earthquake preparedness. For doing that it took almost three days for them. Ms. Gyanwali's group was declared the winner of the singing contest leaving behind 13 other groups.

Various local journalists who were also present at the program covered event very nicely in their respective media. On one hand, it provided an entertainment while other hand, it helped promote awareness on the earthquake risks among the people. The program became successful as it benefited the community immensely. It also inspired other municipalities to initiate such programs to promote positive messages in the community in this regard.

Success on Building Code Implementation

Surya Prakash Lama, a civil engineer, is the head of the Building Code implementation and Disaster Management Division at the Bharatpur Metropolitan City where he has been working for the past 17 years. During his service at the municipality, Lama attended numerous trainings, seminars and other programs related to the earthquake risks and safe construction. He has also been sharing the knowledge and ideas that he acquired from there to others including householders, contractors, masons, social workers, political parties, professionals and others with view to contribute in the earthquake safe construction practice. While sharing his vast knowledge, he is not limiting himself within the Bharatpur Municipality but also conducting training programs in other municipalities as well.



Surya Prakash Lama
Engineer, Bharatpur

Bharatpur Municipality is also a part of the BCIPN program and NSET has been continuously providing support the municipality and him to this end. With the continuous support from NSET and municipality, he has able to design and implement building code in the municipality, according to Lama.

building code compliance to harass them. Such attitude of the people, however, gradually changed due to various awareness raising programs as the time passed on. The impact of the 2072 earthquake also played positive role to motivate and orient people about the need of following the building code compliance as many people lost their lives due to collapse of weak infrastructures like houses, walls, temples and others. Seeing the transformation in the construction practice, Lama is extremely happy person now. “The increasing level of understanding on the part of people regarding safe construction practice gives huge satisfaction,” shares Lama.

Building Code implementation in Bharatpur Municipality is progressing rapidly and in a well-coordinated manner. The enforcement of penalties has also been set for those who breaches the Building Code rule. Lama says that he is thankful to municipality for believing and giving responsibility for him. “I am also grateful to NSET for encouraging and inspiring me to do good work. If the current co-ordination and joint work between NSET and municipality continues, Building Code compliance rate would be 100 percent in the municipality making the community safer in terms of earthquake risks and other disasters,” said Lama.



His dedication and commitment on implementing Building Code and competency in work has transformed Bharatpur a beautiful and safe city in terms of earthquake risks. According to him, almost 90% of the houses have been constructed according to the Building Code in the municipality area.

According to Lama, municipality’s decision to implement the building code was not well accepted while it was introduced. Locals even accused him of enforcing the mandatory

Mason Training elevate earnings

Twenty five years old Santa Bahadur is a hard-working mason from Gaidakot of Nwalparasi district. He has been involved in this profession for the last 13 years. A training on construction of Earthquake Resistance Building transformed his personal and professional life as it helped him make name, fame and money. After the training, he is feeling very proud of being a mason and has expressed commitment to continue this profession as long as he can.



Santa Bahadur Kumal
Mason
Gaidakot

The training not only helped him harness his missionary skills but also taught him an important thing that masons are life saver as well. It has changed his approach about the construction practice and now he is devoting himself only on earthquake-resistant construction. Prior to training, he used to build only 1-2 buildings in a year but now he is building around 7-8 houses yearly and earning more than Rs. 50,000 per month. His work is highly appreciated by the house owners as well. Training provided him confidence and now he is instilling the knowledge of Earthquake Resistance Building Construction to the communities, house owners and colleagues.

The mason training has changed Santa Bahadur's perspective towards mason's profession. According to him, people often have negative perspective about the masons saying that they waste their hard-earn money in liquor. He argues that all the mason are cannot be put into a single basket. Rather mason is the profession of saving of the lives of the ordinary people.

After experiencing the **self-transformation**, he insists on providing training to all the **masons arguing** that it helps save the lives of thousands of people. Likewise, it also promotes safe construction practice and increase earnings as well as live life with dignity and pride.

Workers association assisting in implementation of Building Code

Madan Paswan is chairman of Bharatpur Municipality Worker's Association of Construction Workers. He has been working as a contractor in Bharatpur municipality area for the last 25 years and has constructed more than 100 houses so far. He had a dream to build Bharatpur Municipality an earthquake safer city and he is working in this regard.



Madan Paswan
Contractor
Bharatpur

Paswan participated in a mason training jointly conducted by NSET and Bharatpur Municipality some four years ago. Then he came to know about the importance of Building code compliance while constructing buildings. Prior to training, he was building ordinary houses without following the earthquake safety measures. He only started building the earthquake resistance buildings after he participated in the training. Since then he has been involving to enhance the capacity of mason's worker and quality of work.

Paswan and his co-workers have formed the worker's association here in Bharatpur and a total of 216 masons are the members of it. According to him, most of them have received training regarding the earthquake resistance construction. The primary objective of formation of workers' association was to help raise the voice and work for the betterment of the workers. The association has also been taking care of the various issues including providing monetary assistance for medical treatment to those workers who sustain injuries due to work place accidents. It also providing compensation to the kin of the workers who

lose their lives due to workplace accidents. Besides that, the association has also approved a provision in their manifesto to monitor the construction activities being done in the municipality by checking whether they are complying building code or not, Paswan says. According to that provision, if any contractors was found to have building houses without following the earthquake safety measures, the association will take action against them.

According to Paswan, his association is working on safe house construction with close coordination and supervision of municipality engineers as well as helping municipality to implement building code. They are jointly holding activities to promote awareness on building code compliance and monitoring activities across the municipality as well as taking action against building code violators if found.

Nowadays, Paswan and his team are taking initiation with the slogan ***Know the risk-No risk*** to implement building codes and mitigate EQ risk in Bharatpur.

Promoting building code implementation in the community



Shanta Rai
Social Mobilizer, NSET
Birtamod

I am Shanta Rai and I have been working in post of social mobilizer at Birtamod Municipality. My association with NSET was started right from the survey conducted prior to implementation of building code implementation program in the municipality. The survey was conducted to assess the status of awareness level of residents of Birtamod Municipality on earthquake risks, earthquake preparedness and building code compliance. As a surveyor, I visited almost all the houses within the municipality area and interacted with the people.

At the time of the survey, we asked the people about the basics to be followed at the time of ground shaking during the earthquake. They, however, expressed ignorance about it. As we visited there again after three years and asked the same question, they answered correctly. Then we assumed that this transformation was due to the intervention of BCIPN program jointly implemented by Municipality and NSET in the last 3 years' period. Likewise, it has been found that the awareness level of the community people regarding the earthquake preparedness and Building Code compliance has also been increased. Besides this, the 2015 Gorkha Earthquake also played positive role to raise awareness of community people on earthquake preparedness and Building Code implementation.

After the implementation of Building Code Implementation Program in Nepal (BCIPN) at the municipality, I conducted many discussions in the community as well as distributed printed documents to the people aiming at raising the awareness on earthquake risk reduction and building code implementation. Prior to commencement of the program, locals were totally unaware about building code and earthquake resistance construction. They used to build houses of their own without following

the mandatory building code. Now the situation has been completely changed and people are constructing earthquake resistance house.

I alone conducted orientations to a total of 600 locals. Along with the orientations, I also provided them the booklets regarding earthquake and building code. While working in the community, I have made very strong bond with them now and they easily recognize me. However, at the initial stage, people used to call me "Bhukampawali Miss" as I was very new to them. I was then so excited thinking that I am contributing to save lives of ordinary people by fulfilling responsibilities given to me by the municipality.

Despite having only two social mobilizers at the municipality, we think that we had accomplished significant tasks at the municipality in terms of earthquake preparedness and earthquake safe construction practice. I believe that we could have done significant more works if we had one social mobilizer each in every ward office of the municipality. I have been closely observing the attitude and behavior of the community people here for the few years and it has been found that their attitude and behavior has been significantly changed. For this, credit goes to the NSET's BCIPN program.

Bhagwati's enlightenment on building of quake resilient house through orientation training

Bhagwati Bhattra Adhikari is a permanent resident of Birtamode-4 Jhapa. She has just completed the construction of her new house. She is very much satisfied with the way that her new house were built and she believes that it is really strong and earthquake resistant one.

People believe that a house is just for protecting people from cold, wind, rain and heat. But Bhagwati built the house considering the earthquakes and other kinds of disasters which could happen in the future. She now contemplates that she would not have been able to build such a strong house had she missed the orientation program organized to the house owners by the municipality. "Prior to the orientation, I didn't have any knowledge and idea of building new house following earthquake resistance measures. My children are too small to take care of construction activities and my husband is also in abroad for job. Nonetheless, I completed the construction in line with the information and knowledge provided during the orientation conducted by the municipality," said Bhagwati. She now feels relax recalling her hard work while building her house. The orientation had enlightened her about the building code and laws and by laws associated with it. It also taught her about other steps and process of building construction. She also knew about need of trained contractors, and masons to build the strong house. She also used trained contractors and masons to build her house accordingly.

According to her, the orientation helped her to learn how to select masons and contractor as part of house construction process. Accordingly, she held interactions and interviews with masons and contractors and selected skilled one after confirming that they were trained. While selecting contractor, she gave emphasis to those who can able to orient his labors and masons to build the house according to the municipality rules.

Her selection of employee including masons and contractors was proved to be very correct

one as they worked honestly in the construction site in her presence as well as in her absence. The trained masons worked according to their skills and learnings. They were very much attentive while working so that there would be no mistakes.



Bhagwati is still active and motivating people even after completion of construction of her house. She is busy teaching her neighbors and other people who are planning to build new houses. She is motivating them saying that house is constructed once in life time so one has to build it with features of earthquake resiliency. She suggests her neighbors to visit municipality office and participate in the orientation trainings before planning to build their houses. She also encouraging them to collect booklets from there and put demand in front of municipality for more trainings. She says that some her neighbors visit municipality for information but other still come to her prior to and during building houses.

House owner should aware of safer construction practice

Gopi Krishna Prasai is an attentive house owner from Butabari 5 of Birtamod Municipality, Jhapa. He built a house following earthquake safety measures just before the 2072 Gorkha Earthquake. Prior to going for actual construction, he had collected some booklets from the municipality regarding earthquake resistance construction practice. He got information regarding the safe construction after reading those booklets where it has been instructed some of the basics criteria to be followed to build a house with earthquake safety measures. Birtamod Municipality has distributed number of IEC materials to the house owners and also conducted orientations on the safe construction practice at the municipality after NSET joined hands with the municipality to implement its BCIPN program.

Prasain's house was not damaged by the Earthquake 2072 either his neighbor's whose house was very poorly constructed. For a moment, he regretted on spending extra money on building but later he understood the magnitude of the Gorkha Earthquake in the eastern regions put fewer damages than in the central region.

Prasain is not restricting the information within himself but also sharing it with his neighbors as well. He advises people to consult with various people before commencing house construction including engineers, trained masons and others construction experts regarding construction of building. He also suggest to continuously visit municipality to keep updated with the Earthquake Resistance Construction knowledge and also to attend an orientation program in municipality which is conducted once in a week for the house owners. Now, he assures of being fully aware of earthquake resistance house construction.

Prasai's own desire and willingness dragged him to scrutinize the knowledge about Earthquake Resistance Building. He

has studied all the handbooks related to it. He has been sharing his knowledge and request every house owners, colleagues, and relatives to read those handbooks to know and understand about Earthquake Resistance building by themselves. He put in front his voice for following the Building Code Implementation for safe and secure life. He is grateful to Municipality for providing service to answer every query related to the building construction.



Mason Training helps enhance masonry skills

Ms. Sunita Tharu, a mason by profession, is an inhabitant of Kanchanpur, Bhimdatta Municipality. She married in a family associated with construction work. Her husband is a mason and her mother in law was also used to work as laborer at the construction site. Sunita's life took a U-turn after her marriage because she was not associated with the current profession prior to her marriage. At the initial stage of her married life, she did confine herself within kitchen and home. But few years after her marriage, she and her husband sifted to Bazaar area started to live there. Then she started job in the construction site as laborer. She did not feel difficulties to find the job then as her husband was a mason by profession. Four years after working as a laborer, she started working as mason. It has been now 4 years that she is working as mason. Despite being a woman, she doesn't feel any discomfort to work as mason. She feels easy in her work as she has no child, therefore, needn't to take care of them.

Now, Sunita has received 7 days long mason which was jointly conducted by NSET and Bhimdutta Municipality. Her husband, however, missed it as he was out of the country for job. After the training, she felt that her masonry skill has been significant increased. She has learned many new skills as well. It has also boosted her confidence level. This training has helped her find more work as well as gain trust of the house owners.

“What I did as part of work prior to training was just on the basis of seeing other's work. After training, I acquired lot of new skills and started to apply all the acquired skills, knowledge and technique learned from training in my work. I am very happy for the transformation that she has experienced due to mason training,” said Sunita.

According to Sunita, numbers of women workers are increasing in her construction site. However, most of them are laborers. Nevertheless, four to five laborers have

already been transformed into masons. She feels very much proud for this. Although, people criticize over adopting the so called male's profession, she doesn't care so much on the matter.



Dil Kumari inspires women to earn and learn



Dil Kumari Sunuwar
Masaon, Tulsipur

Dil Kumari Sunuwar is a resident of Tulsipur and a mason by profession. A mother of 2 sons, Dil Kumari chose this profession under the dire circumstances. When her youngest son was 2 months old, her husband fled the house and never returned even after 8 years. As the responsibility of upbringing of her two sons transferred on her shoulder, Dilkumari, a housewife previously, decided to go out to work and started working as a laborer at construction sites. Although, the earning from labor work was just sufficient to run her house, she, however, didn't want to restrict herself as laborer only. Due to her hard work and passion, she became a mason. But it was not easy. Although some co-workers helped on her mission, others discouraged her saying that "female are not supposed to work with "Jyawal". But she didn't give up. Her great desire to become mason, helped her transform into a mason from laborer.

After that her life changed completely as she has started to earn more money. Contractors and house owners are also appreciating her skill and dedication and good work now. She is also finding jobs easily. Earlier, she had been living in maternal home as she took refuge there after her husband fled the home. She has now built her own house. Appreciating her hard work and dedication, a local social activist Ms. Nukhi Rawat recommended her to take part in a 7-day mason training conducted by NSET.

After the training, she emerged as more responsible and dedicated mason. Those

house owners who once ignored her hiring for job just because she was a female, have started calling her for construction works.

She has become also an inspiration for other women who want to work as mason. It has inspired others on how to work and to be self-dependent. She has been teaching as well as giving working opportunity to other females. Now, there has been an increase in the number of female workers in her construction site. Ms. Dil Kumari Sunuwar is very happy now as she feels so proud being a part of the construction field.



Building Code Implementation is difficult but not impossible

Rabindra Lal Mul, a technical facilitator in Building Code Implementation (BCI), is working at the Building Permit Section of Vyas Municipality over 20 years. The municipality implemented the BCIPN program and he is now very much delighted for the positive outcome of the program. According to him, it only become possible only due to their continuous hard work put during last 5 years. Prior to implementation of BCIPN, the building code compliance situation was in terrible state

Mul personally took the initiation to implement the program. Overcoming so many obstacles, the municipality supported him and decided to implement the program finally. According to Mul, had there no cooperation and guidance from the NSET in the each phases of implementation, it was utterly impossible to implement.

beginning. Mul was heavily criticized for the initiation as well. However, municipality did not give up the plan. In 2060 B.S , a survey was conducted with the radius tool with the support of NSET which shown that the buildings were not safe at Vyas municipality. On the basis of results of that survey, he discussed it with the local political leaders and stakeholders. Likewise, a delegation from municipality including local leaders visited Dharan and Lalitpur municipalities where Building Code was already implemented and NSET office. It also worked positively for the implementation of BCIPN.

Currently, there are more than 50 trained technicians, 150 trained masons, 60 trained contractors in the municipality. There are around 400-500 buildings that are being constructed every year and among them, 80% houses have been found to have building code compliance. He says that they might not reach 100% but their commitment is to continue to implement in future as well.



They experienced difficulties to convince people to go ahead with the program at the

Building code compliance: Birtamode is in the stage of learning and teaching



Binod Sapkota
Engineer, NSET

I am Binod Sapkota, an NSET staff worked at Birtamod Municipality as Civil Engineer as part of BCIPN program to provide technical assistance. As part of implementing BCIPN program, I worked here approximately one year with view to facilitate the house drawing approval process at the municipality. The association with the municipality helped me to accumulate tones of field level experience. While working there, I experienced lots of practical, behavioral and social aspects of construction engineering although I had learned theoretical aspects of knowledge during my college study. This is very important for me as technical knowledge alone will not be enough and we need social knowledge too. This is what I learned from the field.

After the implementation of BCIPN in Birtamod Municipality, there can be seen positive changes in drawing approval process of the municipality. In the initial stage, there were huge problem as drawings without fulfilling proper scale would be submitted for approval. After discussion with the municipality staffs, I developed a format for the people who want to build new houses. It helped us to maintain consistency, minimized time and made easy to check all the aspect of the drawings. It also helped to place the required details in the drawing page. As a result, the building code compliance rate has significantly been increased now as the 95 percentage of the submitted drawings found to have met the compliance. A format was uploaded in the website of the municipality so that people can use it by downloading from the website. The same format developed by Birtamod Municipality also started using by the adjoining municipalities like, Taplejung, Phidim, Mechinagar, and Bhadrapur.

At the time I joined Birtamod Municipality, human resources crunch was major problem and the process of approval of the drawings from the municipality used to take months. Likewise, due to old-fashioned filing system, the files submitted at the municipality used to misplace and even disappear. To solve this problem, I developed a systematic entry and filing system using Microsoft Excel with the help of volunteers. Now, it has become easy to

register the incoming files for drawing approval because of newly developed system. Municipality had arranged one dedicated staff for computer entry for this as well. After conducting the training of Building Code Implementation for engineers at the municipality, the quality of the drawing has been improved in line with the building code compliance and error in the drawing has also got minimized significantly.

Except me, there were also other NSET staff members working to provide technical assistance to the municipality as part of the BCIPN program. In association with municipality, the team organized engineers' trainings, mason trainings to unskilled masons, orientations too house owners along with surveys. A total of 186 masons and 42 engineers got trained during the program period.

A joint efforts of NSET and Birtamod municipality has immensely helped to bring the change within the municipality. The visible impacts of implementation of BCIPN program in Birtamod are the improvements in the various facets of the municipality including working culture of staffs and consultant engineers, understanding level of house owners and working standard of the masons.

Within the short span of time, the improvements of Birtamode municipality's working system, drawing checking and

endorsement system and compliance of building code are encouraging ones. Although the pace of implementation is slow and not full-fledged, it will ultimately contribute to build the earthquake resilient community. This municipality has become a role model for adjoining municipalities as well. Other municipalities are also adopting the working model of Birtamod municipality. Birtamod is learning to implement building code and also teaching others to do the same. The way municipality is working now, it clearly shows that one day it would emerged as a model municipality.



Positive change seen towards Building Code Implementation

I am Laxmi Prasad Soti, a Civil engineer and currently working as a focal person of the Building Code implementation program at Gaidakot Municipality Office of Nawalparashi district.

I have been engaging in this profession for the last 12 years. I am working in the department of the building code and building permit of the municipality even before Gaidakot was declared a municipality from V.D.C. Initially, I had very negative perception about the usefulness of the mason training.. But after the NSET and Gaidakot municipality collaborated together to implement the BCIPN and got opportunity to participate in different trainings, my perception was totally changed.

Actually, I was totally unaware about the importance building code compliance. Then my knowledge was at zero level. But 3-4 years's experience has helped broaden my knowledge.



Now I have been conducting the trainings to masons, house owners and community



Laxmi Prasad Soti
Engineer, Gaidakot
Municipality

members. Moreover, the neighboring municipality and V.D.C also hiring me as a trainer to conduct the engineer and the mason trainings. I feel proud enough on my improvement of last few years in this field and thankful to the NSET which helped and supported for this change.

It sounds so simple but to work on the section of building code, but it's not. Despite went through very tough time but I never gave up. BCIPN, NSET have had always supported and inspired municipality and me to work on the earthquake preparedness and building construction following the building code. The training and orientations program for the mason, community (Social governing, women health volunteers, students, women's groups, the political members, ward secretaries, house owners), engineers, sub engineers were organized with the support from NSET. In the past, I experienced very difficulties to gather the participants in such trainings. They used to take earthquake risk threat as hoax. After the 2072 Gorkha Earthquake, the level of awareness on earthquake risks on the locals. They are now demanding the awareness training and orientation programs. The masons come to ask for the mason training. Now it's easy to convince the house owner as well.

My house won't kill any one

Mr. Som Bahadur Tharu of Kali-3 of Bardiya district has been working as mason since 14 years. He has recently got an opportunity to participate in a mason training conducted by Nepalgunj Municipality. The training has immensely benefitted him as he has gained new skills as well as knowledge on earthquake resistant construction technology.

Som Bahadur has now realized that he has got drastic improvement on his skill on earthquake safe construction practice. He learned about correct construction process from foundation to roofing. After the training, many contractors, and house owners started calling to hire him for Job. His financial as well as social status has been improved now. Nowadays, engineers from the municipality also behaving professionally with him and encouraging to continue good work. He has been completely focusing only on the construction of the earthquake resistance building now.



First we used to ask to engineers, now vice-versa

Mr. Gangaram Chaudhary from Dhangadi Municipality-6 has been working as mason since 13 years. He came to know about a training to be held on the earthquake resistance building construction through an advertisement published in a local newspaper. Then, he registered his name for training and attended the training.

Now, he is a trained mason. Prior to training, he was working on the basis of skill learned by looking others' work. But now he is doing work on the basis of his learning from the training. Right after the training, he got a contract of constructing a school building and he built it following earthquake resistance measures.

After the training, he feels that the mason training has benefited him a lot. He is constructing more than 6 houses from 1 to 4 storied buildings. According to him, his earning is also doubled in comparison to prior to training.



NSET's Technician Remarkable Attempt

I am Suyog Giri, a civil engineer by profession. I worked in NSET's BCIPN at Janakpur Sub-metropolitan City as a building code implementing technician in building code implementation unit. I worked there approximately a year and I believe that my service has helped maximize building code compliance there significantly.

The current status of the building code implementation has been satisfactory in comparison to the past. When I joined there, the quality of the house drawing was disappointing. House design was being approved with just four rods. I was so worried then seeing the status of the building code implementation and really puzzled how and where to begin the work.

So, I organized an interaction with the officials at the municipality and they were convinced to enhance the quality of house drawings being approved previously. It brought significant changes in drawing approval process. They started checking the drawings strictly prepared by the private consultancy to avoid the error. Minimum 50 percent of drawings were



Suyog Giri
Engineer, NSET

found to have met building code compliance. Nowadays, the technician of the consultancy were also found to have serious about the matter.



Mason training increased the demand of masons

Mr. Kapten Tharu, a resident of Gulariya-10, is working as a mason since 30 years. He is one of the mason of this area. He is a trained mason now. His son who works at Municipality office had told him to attend a mason training to be organized by the Gulariya municipality. According to him, the training has enhanced his construction skill. He learned skills about making different type's band, rod overlapping rod, proper ways of making pillar rings, and different methods of building RCC and Mud mortar house.

He has started building the pillar with 12 inch *12 Inch now but he used to build with 9 inch *9 inch pillar earlier. Before the training, he didn't know anything about the earthquake resistant construction technique, he is applying all the earthquake resistant techniques and methods of construction technology now. Beside this, he is counseling the house owners and others regarding safe construction

He has realized now that it would be better to have this training earlier. It has given so much encouragement and confidence to him for the work. He has expressed commitment to build only safe and strong house as long as he can continue the job.



Satisfied with the way house was built

I am Ram Narayan Mandal, a resident of Janakpur Sub-Metropolitan City. I have recently built a house with consultation, guidance and suggestions from the engineer. Now, I can confidently say that I have built a strong house.

As I decided to build the house, I went to municipality office to inquire about building construction process and making it safe from earthquake risks. They explained me briefly. Later, I went to municipality along with building drawings of my house. Municipality's overseer took me to municipality courtyard and show me model of buildings and explained me about safe construction practices. He even warned me that house drawing may not be approved if building code is not followed. I built the house following all the earthquake safety measures and techniques. Even my neighbors are convinced that my house built a strong and safe.

Gorkha Earthquake 2072 took many lives, destroyed so many houses which are yet to be reconstructed. According to him, Janakpur Municipality implemented the building code, not to repeat the same consequences from earthquake. In my opinion, building code is for the safety of the public. So we should follow it to make our own house safe from earthquake risks.

There are so many house owners who have built houses without approving the building drawings. They might have constructed their houses in cheap cost but their houses will not be strong enough to save their lives during earthquakes. I have followed all the municipality rules and am very much satisfied with it. I still keep visiting municipality office and found that the municipality has been working increasing awareness on people about the safe construction practices.



Story 18: Construction worker are the builder of earthquake resilient community



Man Bahadur Sunar
Mason, Vyas

I am Man Bahadur Sunar, a mason and I belong to Ward no. 14 of Vyas Municipality. I started to work at construction field from the age of 16, and now it has been 26 years. At the early stage of my carrier, I have worked on constructing school buildings. I had already constructed about 100 buildings so far.

After participating in NSET's seven- day mason training program, I learned about skills and techniques on Earthquake Resistant Buildings Construction. It helped me realize that those buildings which were constructed before training were poorly built. Prior to this training, we didn't know about earthquake resistant building construction technology and methods. After training, I am a certified trained mason now.

In the city area, people build their houses using quality materials under the guidance of Engineers. But in rural areas, only load bearing masonry houses are being built using locally available resources without the guidance of Engineers. All the responsibility lies upon masons.

After the 2072 Earthquake, demand of trained masons are excessively high. The misconception prevalent among the house owners regarding the cost of Earthquake Resistance Buildings Construction has

created difficulty in convincing house owners. After participating in the training, I gained confidence to convince colleagues and house owners for making safe and strong house.

Building code compliance is an important factor for building a safe and strong house. I urge municipality to prepare adequate guidelines, rules, and regulations. Similarly, there should also arrangement of rewards and punishment system. Strong and effective monitoring and evaluation should also be carry out for Building Code Implementation.

The mason training has taught me important lesson that masons have responsibility to make Earthquake safe society. I expect that municipality, engineers, NSET and other organizations involved in this field will provide trainings and orientations. I will remain committed to this campaign.

Joint efforts must for building earthquake resistance house

Biratamod is one of the municipalities where NSET's Building Code Implementation Program in Nepal (BCIPN) program was implemented successfully. Gopal Pd. Khatiwada is a consultant sub-engineer working since 10 years in the municipality areas. In his long experience, he has found out that locals are more conscious now than previously in terms of awareness regarding earthquake risks. According to him, the previous trend of building house using merely 3-4 rods (with 8 -10 mm) has been changed now and locals are now constructing according to building code. However, people residing at the remote settlements are not fully aware in comparison to core city areas about safe construction practices which features use of engineers, trained masons, and contractors and compliance of building code.

Along with house owners, contractors and consultant engineers, who prepares drawings in coordination with municipality and monitors the under construction houses in the field, are also equally responsible for making earthquake resistance house. He believes that consultant engineers should also transform themselves in term of thinking and behaviors. The old generation engineers are may not be used with new technologies and he feels that they should be oriented with changes in the technologies and should provide refreshment trainings.

According to Khatiwada, consultant engineers are assigned to submit the periodic report of the newly constructing houses in the Birtamod Municipality. Numbers of engineers are very less and work load is high in the municipality. With the transfer of responsibility to consultant engineers for monitoring the under construction houses and submitting report, the workload of the municipality workers has been significantly decreased. The consultant are assisting municipalities by monitoring whether they are fulfilling the building code compliance or not. Consultant, house owners and municipality engineers are working with full coordination to implement building code in this municipality, he says.

Khatiwada further adds that engineers should be very aware regarding process of construction of earthquake resistant house from the very starting phase of house

construction which is preparation of house drawings. Preparation of drawings is important factor for construction of an earthquake resistance building. So, the engineers should be very committed and should work with honesty to implement the building code for the sake of the community and the nation to make the earthquake resilient community.



Khatiwada says that there is also chances of heating or misguiding the house owner by the contractors as well. In some cases, contractor keeps house owners at dark as well. To overcome this problem, consultant engineers have huge role to play and house owners are must be oriented in line with safe construction practices. He said that house owners should be able to monitor the construction process and methods

themselves in the absence of engineers. It will help to reduce the technical error of the construction. It further helps to make the contractor and masons to be sincere in their work

In order to make an earthquake resistant house, various stakeholders such as House owners, Municipality, Consultant engineers, contractor and masons are equally responsible. A small flaw from the

part of any one of above may jeopardize house safety.

According to him, the coordination between consultant and municipality is progressing smoothly building a safer city. It will help to build the safer city and role of consultant engineers will be widely acknowledged for making Birtamod municipality safe and stronger one in term of earthquake risks.

Kama Rural Municipality progressing well on Building Code Implementation

Kamal Rural Municipality is located in Jhapa District of Province No. 1 of Nepal, adjoining to Damak Municipality, one of the highly developing municipalities in the district. The municipality has covered an area of 104.57 square kilometers and the total population is 44,365 as per the Census of Nepal, 2011. The Rural Municipality is divided into total 7 wards. The new local body was formed after merging the two separate previous Village Development Committees (VDCs), namely, Topgachchi and Lakhanpur. The headquarters of the rural municipality is situated in Topgachchi.



The municipality has enforced Building Permit System (BPS) in consistence with the national building code lately. "The erstwhile Topgachhi VDC had enforced the BPS while it was not existing in Lakhanpur VDC. After the formation of new local body, BPS has been made mandatory at the wards of new local body including erstwhile Lakhanpur VDCs too," shares Mr. Thapa who is also head of building permit section of the municipality.

However, it was not easy task initially when there were no elected representatives at the municipality. Socially and politically powerful people were often issuing threats to employee-led then administration against the plan.

Being the head of technical section of the municipality, Mr. Thapa took major initiative for introduction of BPS in the municipality in line with national building code. "The elected representatives of the municipality have also supported me on the issue," he remarks.

Acknowledging that fact that skilled masons are the utmost requirement for construction of earthquake resistant building, Kamal Municipality has completed three mason trainings through which 98 masons got trained on earthquake resistance construction. "The first batch of such training was conducted on April, 2018, through which altogether 32 masons got trained. Three months later, we conducted another training for 31 masons. The third training was conducted in February 2019 through which altogether 35 masons have been trained. Masons were also extremely interested and excited to have such trainings as well," Mr. Thapa states.

In carrying out first two trainings, NSET/'DaroGharDigoBasti' program provided technical support for the trainings while the third was conducted with the technical and financial assistance of NSET-DaroGharDigoBasti program. On the top of that Kamal Rural Municipality has accomplished two mason orientation programs comprising 20 each existing masons, two house owner orientations, one ward level orientation comprising, social, political and community leaders in addition to three mason trainings with the technical assistance of NSET.

In order to institutionalizing the building code, the municipality has now also enforced licensing system for trained masons. Out of 63 masons trained by rural municipality, total of 45 have been issued license. With this, the potential house owners who want to build their house now must hire these licensed masons for the construction of their new houses.

Vyas Municipality paves long term efforts to improve seismic safety of Building Structures

Vyas City, the headquarters of Tanahun District in west Nepal, declared as Municipality in 1991 has paved a long course to improve building construction practices ensuring seismic safety of the structures. The Municipality has 14 wards, that occupies area of 248 sq. km and has a total population of 70,335.



Nepal is at high risk to earthquakes, and effective enforcement of Building Code is necessary to reduce the impending earthquake risk in the country. Vyas Municipality initiated the Building Code Implementation (BCI) with the development of earthquake scenario in 2007, that helped in raising public awareness. Then followed various mass awareness programs in the area. Vyas declared National Building Code mandatory in Vyas in 2011. According to Mr. Rabindra Mul, Senior Municipal Engineer, mason trainings, engineers' trainings and orientations for house-owners and communities were conducted massively since then.

Vyas went ahead with the formation of mason groups, preparing list of consultants and allocation of budget for BCI in 2012. Trained Masons and Consultant Engineers were registered. In 2014, an Advisory Committee of technical consultants was formed as follow up action. The same year, licensing system for trained Masons and Contractors started along with reward and punishment mechanism.

Vyas started field supervision of under construction houses and building since 2014 through consultants. In 2015, municipality prepared and implemented building permit guidelines and also developed and went on to

implementation of Revised Building Permit Book. In 2016, Vyas initiated field supervision of under construction houses through consultants with mechanism of reporting of field supervision through photographs. In 2017, implementation of revised building permit form started. Further, Municipality increased technical workforce of the Municipality and launched field supervision/ inspection through its own team of engineers. Building Permit System Software was installed in the Municipality to convert existing permit system into digital system in the same year. In 2018, development of Building Permit Guideline and implementation of two copy format of permit book initiated. Mandatory checks for structural design of B class Buildings was also initiated the same year. In addition, Municipality is conducting orientations regularly for house-owners focusing on earthquake safety awareness. Likewise, Mobile Earthquake Clinic program is being organized to monitor BCI works.



In these efforts, NSET provided technical assistance, strategic guidance and various support to the Municipality through various programs implemented by the organization.

Now, Building Code Implementation has been ensured through 14-steps Supervision from consultant and monitoring from Municipality in 3-steps. The reward and punishment

mechanism initiated evaluating the performance of masons and consultants. As per record of fiscal year 2017/18, total 709 number of houses were permitted for construction by Municipality which is around 93% of the building constructed in Municipality. In 2019-2020 alone, 450 new buildings were constructed with permit. Currently there are 20059 building stock in the Municipality. Till date, Municipality has provided earthquake resistant mason trainings to 520 masons while a total 174 consultant engineers have been trained so far. Nowadays, most of the newly constructed buildings are Reinforced Cement Concrete (RCC) type.

Mr. Baikuntha Neupane, the Mayor, believes that they have experienced challenges such as difficulties in bringing the non-compliant buildings into the building permit system, development of proper regulation for retrofitting of existing building stock, dispelling negative influence of other neighboring municipalities having non-enforcement of building code, discouraging tendency of evading of the building permit process by government buildings and schools despite going through house design approval system and bringing the rural part of municipality into building permit process which were recently merged into the municipality, among others.

Vyas Municipality has learned important lessons from its efforts. "BCI is not only a technical but also a social issue. It can't be implemented without the trust of community. It needs to be complemented by at least one percent of Municipality's budget per annum" said, Mayor Neupane.

Vyas Municipality aims to continue awareness promotion and capacity building programs. It also aspires to accelerate proper site supervision activities and monitoring system. Further, the Municipality is planning to incorporate and mainstreaming Earthquake Risk Reduction in Municipality Plans and Policies and implement building permit software to digitize Building Permit System.



A journey of a Female Mason who is contributing to Safer Building Construction



Pema Chaudhary,
Mason, Godawari
Municipality-Western
Nepal

I have been engaged in construction works since past 10 years. Initially, I worked as a Labor but its now 5 years I have been in masonry works. Now, I am different from what I was 10 years back. I am a trained Mason, who knows how to build an earthquake-resistant house.

I was willing to be a mason. Sometimes masons used to be absent at the construction site where I worked, that was an opportunity for me to hold the trowel. This way, I started working as a Mason.

In 2018, I got the opportunity to join mason training focusing on construction of an earthquake-resistant house. Under USAID supported program, National Society for Earthquake Technology-Nepal (NSET) had conducted Mason Training that taught me many ideas and skills of Earthquake Resistant Building Construction. We knew that we need to improve the way that we were doing every day. Earlier we used to build only houses but now we are building safe houses. Now, I am involved in the construction work from the foundation to the roof of the house. My husband is also a Mason. But I took the training and he has not. It would have been easier for me to work together with my own husband, but he never took me to work with him. Therefore, we always worked at different construction sites.

My husband's income is not enough to support the family and educate children. I also started earning so that all the expenses are easily met. I have also some savings. When I started working that helped my husband and family to tackle financial burden. As I am trained mason, I get work more easily. After receiving the training, I feel that I am not only earning money but also contributing to society and the municipality by building earthquake-resistant houses. After taking the training, I started to feel proud of my

work. Now I am thinking of building my house according to what I have learned in the training.

There are many challenges in this profession, but women face more challenges. We have 3 children. Doing all the housework, farming work, and also go for construction works all day is very much tiring for a woman. My husband leaves for work at around 8am in the morning but that's not possible for me.

It seems for the society that the Masonry work is done only by men. It is true that in the past, there were not many women in this profession. I also face many problems to manage my household activities and mason works, but I wanted to earn something for my family and I took challenge to manage own tasks.

But again, it is very difficult for a woman to work that requires more physical labor like a Mason. Not only that, the salary I used to get when I was working for labor has not been increased even after receiving the training. If there was a male Mason in my place, his salary would have been doubled or he would have become a contractor. I made progress at my work, but the wage rate is same as previous. But now this work becomes my habit, so I am thinking of doing this work as long as my health supports me.

Mason training changed my perception towards my profession

Mr. Kumar Majhi of Kamal Rural Municipality-4, a mason by profession, is 37 years old now. He has been involved in the construction field as mason from the past 24 years. He started the job as construction laborer from the very early age of 12 with his elder brothers. His father, however, was not from this profession. He learned and enhanced his basic masonry skill gradually while working as laborer.

Mr. Majhi got an opportunity to work in Nepal as well as in foreign countries as mason. Around 8 years, he worked in Russia, Ujbekistan, Saudi Arabia and Qatar as well. He, however, did not get opportunity to practice fully his skill as the nature of job was little bit different in other countries except Qatar.

Whatever the skills he had learnt earlier was taught by seniors and co-workers and acquired learning by doing. Besides that, he did not get any opportunity to have training until April 2017 to enhance his traditional masonry skill. But, he finally got an opportunity to sit in a 7-day mason training in 2017. It was conducted by Kamal Rural Municipality with the technical assistance from NSET.

It was first kind of such training in the municipality and an executive member of the mason workers' union informed and proposed him for the training and he immediately accepted it.

After the training, Mr. Majhi perception towards his profession drastically changed. He says, "it is not the profession of mere construction of physical infrastructures like houses and other structures but a huge responsibility of making the building safe during earthquakes."

Mr. Majhi has been thoroughly applying the learnings and skills of the mason trainings. He thinks that realization of weaknesses of the past

and learning lessons from them is very important especially after any training. The mason training helped him learn very good lessons. He had built around 20-25 house buildings prior to mason training. But after the training he has realized now that there were several flaws which he should not had done while building a house. He thinks that the realization and lesson learnt would definitely contribute him to carry out good works in the days to come.

He has altogether four members in his family. He has been earning daily wage of Rs.1000 to 12000 per day nowadays and which is enough to feed his family members. The daily wage has now gone slightly higher than before mason training. After the training, he has accomplished construction of 2 houses as solo petty contractor. Likewise, he has also involved in the construction of 20-25 houses after the training on a daily-wage basis.

However, he finds several challenges to replicate the knowledge acquired through trainings as there are immense unhealthy competitions in the field. The house owners are also less educated and yet to be convinced about the need of earthquake resistant house in Nepal. Similarly, people have a lot of misconception about the actual cost of earthquake resistant construction. At times, he has found difficulty to implement skills as house owners are reluctant to implement such skills.

Mason Training help Shyam Rai settle in Nepal

Mr. Shyam Rai of Kamal Rural Municipality-4 is working as contractor. Earlier, he was a mason. He did not study much and therefore, involved in his father's construction project while he was young. While assisting father in his work, Mr. Rai acquired masonry skills from his father and became a mason.

Although, he was earning good enough money while working as a mason, Mr. Rai decided to go to abroad seeking to earn more money. Then he went to Libiya, Africa with the help of human smuggler with the hope of sneaking through to Italy from there.

But things did not go as he expected. He spent about a year over there but failed to cross the Libya-Italy border despite his utmost attempts to do so. He was arrested by Italian border authority and deported back to Nepal in 2010.

As he landed in Nepal's Airport in Kathmandu, Mr. Rai promised that he would never ever try to go abroad in future tearing down the passport.

After his failed bid to work in abroad, he started to work as mason initially and then became petty contractor. Until April 2017, Mr. Rai constructed around 25 to 30 houses. Long after his engagement with the profession, he got an opportunity to sit in a mason training where he knew various knowledge of safer construction techniques which he was not aware of before.

He found those techniques very much appropriate in the context of earthquake risk and recurring earthquake incident in Nepal.

He learned several new techniques of constructions such as need of foundation beam,

seal band, lentil band, proper arrangement of rods in pillars and ceilings among others.

Further, Mr. Rai also enlightened with that knowledge that every pattern of houses made up of stone-mud, brick-mud, concrete-brick, bamboo, wooden can be made earthquake resilient if we could slightly change construction approach and methodology.

In addition to this, he also knew about some of the basic components and techniques to make the building infrastructure resilient to earthquakes.

Mr. Rai has realized that the training has tremendously contributed in getting contract of new houses ultimately boosting his over all income. For him, this training is good and every one of masons/ contractors needed to be trained on earthquake resilient contraction.

According to him, the house owners have also cooperated with him to implement the safer construction techniques that he acquired through training. He need not convince them much to do so.

He, however, finds unhealthy competitions among the masons and contractors as one of the issue which has been creating hindrances in implementing safer construction practice in the field. Municipality must monitor it strictly.