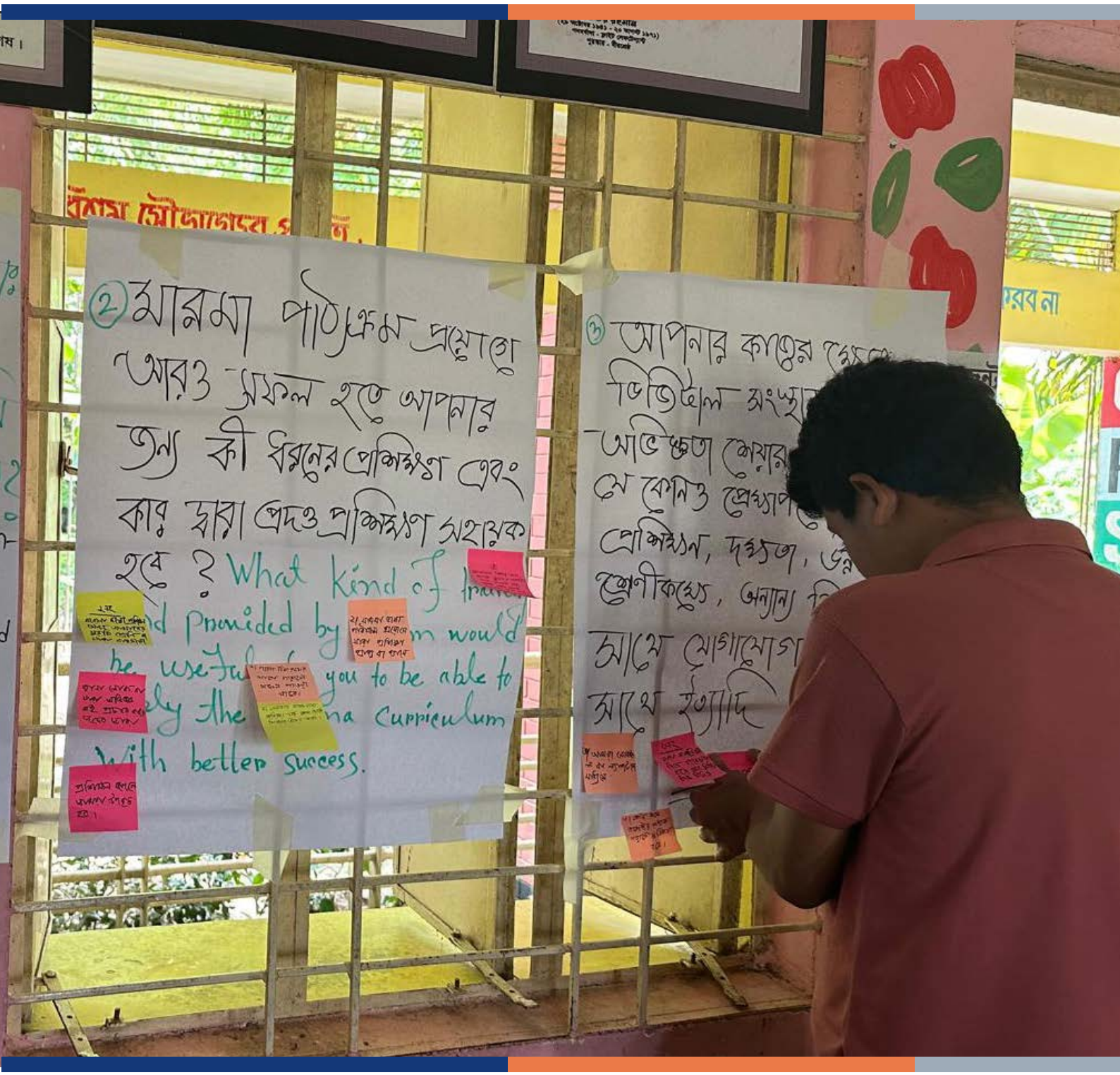


EdTech's potential

for effective mother tongue education

Language exclusion impacts education for Marma children - carefully designed education technology can be part of the solution

DECEMBER 2024

CLEAR Global

Summary: what you absolutely need to know

The Marma community is the second largest Indigenous community in the Chittagong Hill Tracts (CHT) region of Bangladesh, numbering around 300,000. Yet many Marma struggle to become literate in their first language, and Marma teachers struggle to teach reading and writing skills for Marma. The Government of Bangladesh has made efforts to implement mother tongue education (MTE) for pre-primary and primary schools, such as publishing and distributing textbooks in Marma and other Indigenous languages since 2017. But policy issues, lack of resources, patterns of exclusion, and lack of support for teachers mean MTE is still not a reality for the Marma community. Compounding educational, social and economic exclusion such as low connectivity, poverty rates, high dropout rates and resulting low employment opportunities make this more difficult.

This research explored the problems - and potential solutions - for Marma teachers from Khagrachari District of the CHT face in implementing MTE. We aimed to find out how technology - in particular language technology - could help bring Marma into the classroom and improve educational outcomes for Marma children. We heard from Marma teachers at both pre-primary and primary level, working in government schools in multilingual and monolingual settings in urban and rural locations. We also heard from other stakeholders such as education officers, experts from non governmental organizations and National Curriculum and Textbook Board (NCTB) Marma textbook authors.

The low level of literacy in Marma is the main barrier to effective MTE. Marma is largely an oral language. A written form exists but is not standardized or widely known. Most Marma can't write or read the language, even teachers who speak it with their students. Though materials to support MTE exist (such as textbooks in Marma), most teachers can't use them.

Marma students are at a disadvantage in school. MTE policy promotes the use of the student's first language in early education. Yet in reality, teachers and parents often still prioritize Bangla as Bangla proficiency offers significantly better economic prospects. Marma and other Indigenous children experience lower educational outcomes and higher dropout rates than the national average.

Initiatives to support Marma education and education technology in general have not had the intended impact. Teachers in Khagrachari mostly do not know about or do not use the government-led digital portals like the Muktopaath e-learning platform, or know how to create digital content in Marma. Some teachers value existing government policies promoting MTE, but these policies do not address other barriers to MTE such as lack of training or literacy. Community-level initiatives to support Marma, such as volunteer-led classes, are valuable but need more resources to be effective.

Experiences of and access to technology in the CHT vary greatly, so there is no "one size fits all" solution for MTE. Many Marma teachers struggle to access basic devices like laptops and lack reliable internet connectivity. Some schools in urban areas have laptops and projectors but electricity disruption often hinders its use. Schools in rural areas rarely have computers or electricity access.

Phone-based educational tools would be much more practical and accessible than computer-based tools.

Technology has significant potential to improve MTE - but only with adequate support, training, resources and infrastructure. Marma teachers felt positive about using technology for Marma, but they face several challenges that make an EdTech solution less effective. Teachers would need more training in ICT and in the Marma language. They also need support from school administrations and educational authorities to address the practical challenges of implementing MTE, such as lack of time in the curriculum.

A note on the use of 'Indigenous' and 'ethnic minority': UNESCO notes that "There is no internationally agreed definition of what constitute indigenous peoples or ethnic minorities." This report uses 'Indigenous' to refer to communities such as the Marma, who are minorities nationally but in a majority in some parts of CHT where they have lived for hundreds of years. We feel this is a more accurate description than 'minority' in the context of the CHT. We believe it is also clearer in relation to historical and ongoing tensions with other communities who have settled in the area.

Language exclusion impacts Marma people's education and language use

Marma speakers and speakers of other Indigenous and minority languages in Bangladesh experience language exclusion and other forms of exclusion. Understanding the dynamics of language exclusion that teachers and learners face can help policy makers and others involved to develop relevant, accessible interventions that support Marma children in their early years of schooling.

All the teachers interviewed identified language barriers as the main issue Marma students face when starting school. They noted that the lack of MTE resources and support such as language training for teachers makes it very hard for teachers to provide a comprehensive learning experience that respects and incorporates the Marma language and culture. The lack of language support also contributes to lower academic performance among Marma students.

Language use in the Marma community

Residents of the CHT speak at least 14 languages. Approximately 300,000 people mainly in Rangamati, Bandarban, and Khagrachari districts use Marma in their daily lives. Thirteen Marma dialects are spoken across 13 clans, but speakers of different dialects can largely understand each other. However, the Marma language is not standardised. Intonation, writing and spelling vary between dialects, which increases the challenge of teaching Marma.

An unknown proportion of Marma speakers are monolingual; these include some older and rural community members.

People in the Marma community mostly speak Marma at home and with other Marma speakers, although they use some Bangla and English words when the Marma equivalent is not well known. Few non-Marma people living in Marma-majority areas, such as Bandarban, can also speak Marma. Similarly, many Marma living in urban areas also know some Chakma and Tripura and can use words in those languages when interacting with people from the relevant communities.

Research participants told us that most Marma community members who live in towns and cities can understand and speak Bangla, but Marma in more remote areas, with less exposure to Bangla, have more difficulty using it. Lower access to education in rural areas compound this communication barrier. Marma living in urban areas who were educated in bihars (temples) instead of Bangladeshi schools may also struggle to communicate effectively in Bangla. Religious gurus (monks) who studied in Myanmar only speak Marma; their ability to share their knowledge with the community relies on everyone else's fluency in Marma.

In the community, verbal information is usually shared in Marma and written information in Bangla. This is in line with the (literate) community's preferences. But, many participants told us that if they were literate in Marma, they would prefer to receive written information in Marma too. In monolingual and remote areas, Marma speakers are excluded from official information like severe weather warnings unless someone travels in person to translate for them.

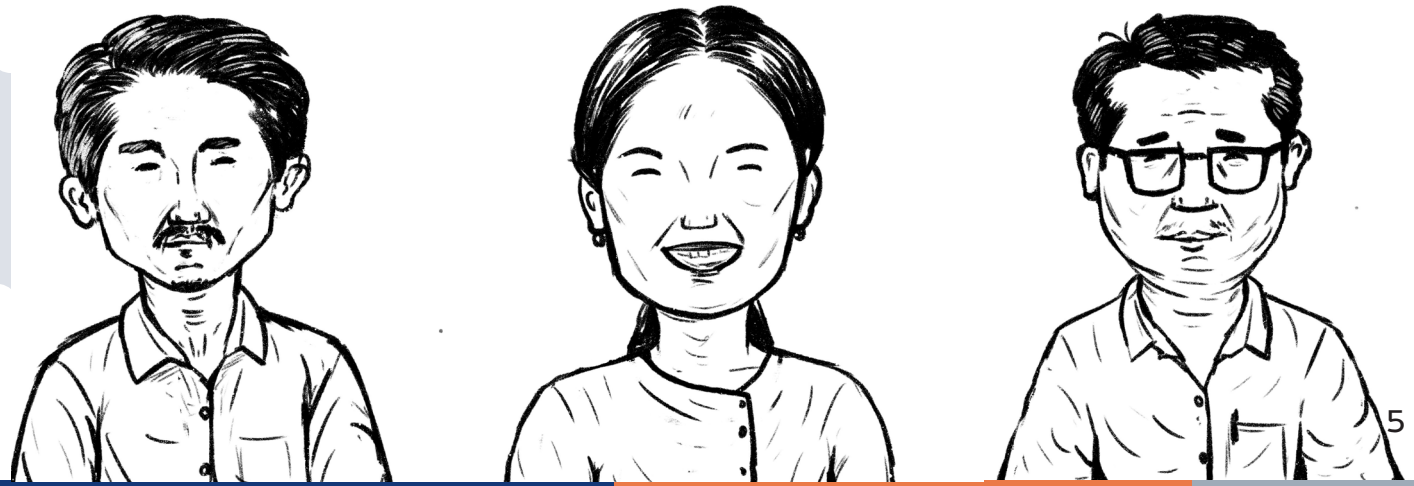
The Marma generally do not face language-based stigma within the CHT. However, one interviewee noted that some people mock or take advantage of villagers who come into town to sell produce because of their limited understanding of Bangla. Another interviewee said that Marma people can experience discrimination due to language outside the CHT, for example when they attend college or university.

Bangla offers significantly better economic prospects, which affects how Marma speakers use and learn their first language

Since 1971, the official language of Bangladesh has been Bangla. All Bangladeshi citizens are required to learn Bangla. This has posed problems for some ethnic groups, as some children struggle to keep up with a Bangla-centered curriculum in schools while others focus on Bangla at the expense of fluency in their first languages (Dey et. al. 15/11/2023). This language barrier affects comprehension and participation in classroom activities, contributing to lower literacy rates and academic performance.

The Marma community recognize the importance of and prioritize education, including sending their children to school despite financial hardship. However, job opportunities are often tied to proficiency in Bangla and English, so parents tend to prioritize these languages over Marma for their children's education. In urban areas especially, children and young people grow up speaking Marma only within the family.

Members of the Marma community have relied primarily on bihars to learn to read and write in the Marma language. Marma is used as a language of instruction in monolingual schools where Marma-speaking students are in the majority. Teachers speak it to facilitate teaching the students Bangla or English literacy and teaching materials are largely still in Bangla for most subjects. In very few schools, teachers try to teach using Marma language textbooks, but this is only possible if the teacher is literate in Marma. Several initiatives and programs to support Marma language learning outside formal education also exist. These aim to encourage young people to learn the language through optional classes, competitions and other activities. Some limited digital initiatives on Marma language learning do exist, but they are not widely used or known about. These may also be inaccessible to Marma speakers living in remote areas or without access to the internet or mobile technology.



Low literacy and lack of language standardization complicate learning and teaching

Marma is largely an oral language; it has not been standardized and most Marma speakers can't write or read the language. This presents challenges for increasing literacy and preserving the language, including through using technology. Research participants gave various reasons for the low literacy and fluency in the Marma language, including:

- Some people used to study in bihars where they became literate in Marma. This is less common now that public education is more widely available.
- Families encourage children to be literate in Bangla instead of Marma to improve their economic prospects.
- Children often lack time to learn Marma because many are already engaged in the after-school tutoring, which is common in Bangladesh.
- Marma youth are generally not interested in learning to read Marma.

"It is crucial for Marma children to first learn their language as a foundation. Once they are proficient in Marma, they can more effectively learn Bangla. While Marma students should learn Bangla, their education should start with a strong grounding in their language to ensure better ovAerall academic success."

- Female assistant teacher (46-55), multilingual school (Khagrachari Sadar/main town area)

However, everyone we spoke to recognized the importance of Marma literacy. Research participants stressed its value for cultural identity, community representation, and bridging to learning in Bangla.

Marma is also not digitalized. Some Marma speakers who are literate in Marma can use the Burmese keyboard to type Marma because the scripts are very similar. But, this is uncommon and many choose to navigate the digital space in Bangla or English due to higher availability of resources and ease of communication with others. A standardized written version of the Marma language is a necessary step for the development of Marma technology.

Generally lower literacy rates in Marma communities, even in Bangla, compound these challenges. Literacy stands at 63% in Bandarban and 71% in Khagrachari and Rangamati. Literacy rates are lower for women than for men, and are higher in urban areas.

Overcoming language exclusion in education requires a many-sided approach

Overcoming language exclusion in the education sector is not just a matter of offering language classes. Terrain in the CHT is rugged and roads are often of poor quality. Many students and teachers have to travel a long way to school. Sometimes the journey is also unsafe. During the monsoon season, attendance drops sharply as the mountain roads become hazardous. This affects enrollment, attendance, and the availability of qualified teachers. Many schools in rural and remote areas lack basic facilities like proper classrooms, sanitation, and learning materials in the pupils' languages.

Understanding the systemic issues that affect teachers and learners can help educators, policy makers, education technology and content developers and others to develop meaningful and sustainable solutions. Ideally, a range of changes are needed to embed Marma teaching in the education system in the CHT.

Teachers identified several factors that make it hard for them to teach Marma, even though it is their first language:

- The Marma curriculum is very recent, so all current Marma teachers were educated in Bangla. While they can speak Marma, very few can read or write it, making it hard to teach the language to their students.
- There are not enough qualified teachers who are proficient in Marma. Many schools have received teaching materials in Marma and other Indigenous languages but have no teachers who can use them.
- Class schedules have not been adapted to make space for language classes for students whose first language is not Bangla.
- Teacher training sessions in the Marma language are insufficient, irregular, and not available to all Marma teachers. Teachers told us they had received different amounts of training.
- Some multilingual schools have no Marma teachers. In others, Marma teachers have to teach children from various linguistic backgrounds so they resort to using only Bangla as the language of instruction.
- English and Bangla are still perceived as the best languages to know to be successful after completing education.
- Some participants also told us that bribery is required to secure a teaching position, resulting in students being taught by teachers who had the money to pay a bribe, not the most qualified candidates.

Teachers feel unequipped to cater for the range of learners' language learning needs

Some schools in the CHT are multilingual, with children from several language communities in one class. In Khagrachari District, the most common are Marma, Chakma, Tripura, and Bangla.

Most multilingual schools do not have teachers from each language community, so they have to use Bangla to communicate. From pre-primary to grade 3, teachers and students struggle to communicate with each other because students only start to learn Bangla once they start school. Teachers sometimes ask older students to help translate for the younger students. In later grades, communication becomes easier as the students improve their Bangla skills. Other schools are monolingual: students are usually from one language background so teachers can more easily use that language as a language of instruction. But these schools are usually more rural and lack infrastructure and resources, which impacts the quality of teaching.

Teachers in primary schools with ethnically diverse student bodies struggle to conduct Marma language classes exclusively for Marma students. Some schools have mainly Marma students but lack Marma teachers, while others have Marma teachers but no Marma students. Teachers interviewed also noted that schools often do not have sufficient space or classrooms to conduct separate Marma language classes. A dedicated hour for language classes could at least ease time pressures in these contexts, allowing students to split up and study their respective languages apart before convening again after.

Existing resources in Marma and on MTE have great potential, but many are unused or not widely available

We heard about several national and local initiatives to promote the Marma language. But practical challenges and a widespread lack of training and awareness for teachers means these efforts struggle to be successful or sustainable.

In 2017, the Government of Bangladesh and the National Curriculum and Textbook Board (NCTB) started to publish pre-primary and primary school textbooks in Marma, Chakma, and Tripura (grades 1-3) for the subjects Marma, Bangla, English and Math. Schools where Marma students are in the majority have received these books, but schools with fewer Marma students have not.

Participants described several Marma teaching initiatives from non-governmental and community-based organizations including BRAC, Zabrang and Caritas, Save the Children, and the Bandarban Khudro Nri-goshti Sanskritik Institute. These included books for different groups of learners, volunteer teaching, language classes, a literacy training course, and funding to recruit Marma teachers. However, in some cases these initiatives only lasted a few months. We did not hear about any collaboration or coordination between initiatives.

Marma religious institutions and monks also develop Marma language materials, and some teachers shared examples of monks volunteering to teach Marma in their local area. Bihars have books on the Marma alphabet, history, culture, and religion. Marma language books can also be found at Bandarban district council, some libraries, and some local NGO and CBO offices. However, many people do not use these books because they cannot read them. There are ever more emerging Marma writers; we heard that Marma readers increasingly prefer to read these local authors over material from Myanmar.

Despite these efforts, teachers described challenges they face using Marma in their classrooms:

"We also want good quality books; when the print is good and clean, students are more interested in learning. This year, the book quality is really bad, and students are not getting interested. If we get audiovisual content, pronunciation, and translations for Marma books, that would be great. Additionally, a specific classroom dedicated to Marma language classes, exclusively for Marma students, is needed."

- Male headteacher (46-55), multilingual school (Khagrachari Sadar/Main town area)

- Marma materials are not integrated into instructions on how to apply the curriculum.
- Class times are too short.
- There are no time slots or assigned classrooms for Marma language classes.
- Many materials are in written form, which is inaccessible to the many teachers and learners who cannot read Marma.
- The very limited audio and video materials on platforms such as YouTube cannot be downloaded so are not useful in areas with limited connectivity.
- Some teachers are not aware of the materials that exist, or how to access them.
- Support and guidance on how to implement MTE in Marma are limited.

All the teachers mentioned parents' lack of awareness of the importance of MTE as an issue. They believe that local community leaders and traditional leaders should raise awareness among parents and students in order to improve the educational outcomes of Marma students. One headteacher suggested that the government should allocate funds to bring inspirational figures from the community who can read and write in Marma to schools to motivate the children and parents.

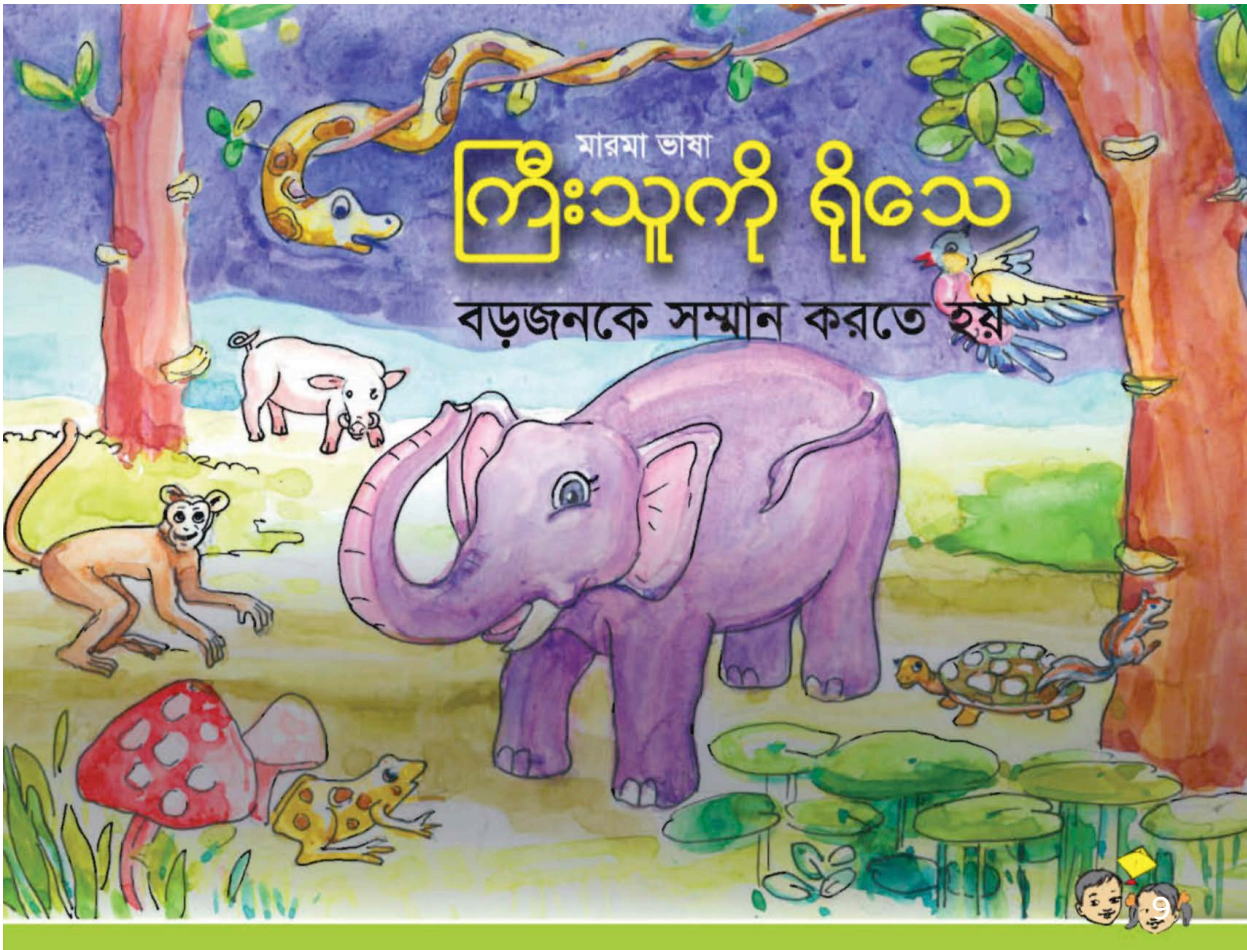


Image from National Curriculum and Textbook Board (NCTB) : Baro janka

If correctly designed, ICT interventions can be an important part of the solution

Connectivity and access to technology vary in the CHT

Overall, our participants felt positive about the potential of technology and were excited that digital tools could help them use Marma in their teaching. But EdTech developers need to consider the significant practical constraints when designing and building technology to be accessible and effective.

There is a significant gender gap in mobile phone use across all districts of the CHT. Male use averages 82.99%, significantly higher than the female average of 56.39%. This gap is bigger in the CHT than in other areas of Bangladesh, which may reflect potential sociocultural, educational and economic barriers for Indigenous women. There is also a clear rural-urban divide in mobile phone use. Gender disparities in mobile phone use are greatest in rural areas of the CHT.

Average internet use is much lower than mobile phone use in the CHT, at about 30.45%. In general, Bangladesh has one of the largest unconnected populations in the world, at 55.5% (Kemp 31/01/2024). Challenges include:

- Relatively low internet connection speeds across Bangladesh.
- Varying digital literacy and awareness of internet services.
- Less content and fewer services relevant for the local population.
- Gender disparities in internet use - for example, 40.66% of men in Khagrachari use the internet, compared to only 18.86% of women.

TThe Government of Bangladesh prioritizes integrating ICT into teaching and learning as part of its commitment to "Digital Bangladesh". It has established multimedia classrooms in over 50,000 primary schools, but many schools within the CHT do not yet have the infrastructure to support digital education. Some schools in Khagrachari District are now equipped with ICT tools and internet, but gaps remain. The digital gap is at risk of widening, especially for rural schools (Ministry of Education Report, 2019).

People are excited about the potential of EdTech for Marma teachers and learners, but ICT interventions need complementary support to be effective

Overall, teachers felt that there was a lot of potential to use technology to support the use of Marma in schools. Some described how they already use digital content and tools in their work (although not specifically in Marma). This includes making presentations, communicating with teachers and other stakeholders, and using ready-made digital content provided by education authorities.

However, others said they lacked confidence to use ICT tools.

Some had no access to the necessary resources like laptops, projects, computer labs, or stable electricity. Female teachers mentioned they do not have the time to learn these skills as they spend a lot of time on work and household chores already. Most of the digital labs are located in urban or semi-urban areas, which require considerable travel time. In rural areas, schools may have only received one laptop and one projector for the whole school. Setting up multimedia classrooms or ICT rooms in each school would help ensure the success of digital initiatives. Mobile-based tools would be more accessible than computer-based tools because teachers are more likely to own and be familiar using mobile phones than computers. One teacher suggested that making Marma language lessons available through a mobile app would be helpful.

Given the range of access to and experience of technology and the variety of classroom settings, there is no "one size fits all" solution for Marma teachers and students in the CHT. Teachers described a wide range of factors that impact their ability to teach effectively:

Table 1: Challenges for teachers in different settings

Multilingual / urban schools	Monolingual / rural schools
• Bangla is the language of instruction • More access to electricity, computers and internet • Headteachers seem more supportive of MTE • Teachers more familiar with using laptops, the internet and apps like Zoom / Messenger / WhatsApp for work and at home	• Marma is the language of instruction • Poorer infrastructure • Limited or no electricity or internet • Increased emphasis on learning Bangla as students have less exposure to Bangla outside school • Lack of information and training on using digital tools • Teachers use mobile phones and sometimes use Messenger • Laptops are impractical due to long walking distances for teachers to get to schools
• Lack of dedicated ICT classrooms • Lack of digital content for teaching in Marma • Lack of qualified Marma language teachers - many teachers have multiple classes as well as other responsibilities, which reduces how well they can teach • No or limited training on the Marma language • More focus on developing students' Bangla skills than their Marma literacy skills • Lack of time to use existing digital tools like the Muktopaath platform, even when teachers know about it • Most teachers in Khagrachari are female. Female teachers have to spend a lot of time on household work, limiting time to prepare lessons. Ready-made content or basic tools that are easy to learn would be more suitable than complex tools	

Even though teachers across the CHT have very different experiences, all our user research participants emphasized the importance of first learning from experts when it comes to implementing ICT tools or resources. Both multilingual and monolingual groups suggested that providing ready-made content to teachers, assisting with digital materials, ensuring internet access, and enhancing teachers' ICT skills can help implement and improve MTE. They highlighted that mobile devices are more accessible than laptops and computers, especially in rural areas where teachers have to walk long distances.

"Every two to three years, the curriculum changes, making it difficult for teachers to adapt. While the new curriculum may make life easier for students, it presents challenges for teachers as it is unfamiliar and tough to implement. We often discuss these struggles during our training sessions."

- Female assistant teacher (46-55), monolingual school (rural setting)

The varying rates of digital literacy among teachers is also a significant challenge to integrating ICT interventions, in any language. Some of the teachers we interviewed had received ICT training, but many described that they either wanted more training or had not received any training at all. Participants said the training did not cover some of the necessary foundational skills needed to help teachers who are unfamiliar with technology use the training in their work. This included using a laptop and basic advice on creating digital content. Expanding access to training and adapting training for teachers with different levels of digital literacy can help them implement EdTech into their work. Teachers who did receive training have not had much opportunity to use it due to lack of resources, which leads to losing the skills.

The curriculum changes every three years. Though the government intends to provide training on the updated curriculum, all teachers described difficulty accessing this training.

Training on MTE is not at all available. Teachers also said that they wanted more training specifically on using Marma-language teaching materials such as textbooks. The NCTB has run "training of trainers" (TOT) courses so that Marma teachers can train other Marma teachers on using the textbooks, but some TOT participants had not received training in Marma literacy first. This made it hard for them to learn how to use the textbooks or teach others to do so. One participant suggested TOT courses should be provided specifically to teachers who already have strong Marma literacy skills.

Teachers also wanted more support to understand the policies around mother tongue education, and support from school administration and leadership to put these policies into practice. Another participant recommended increasing Indigenous representation in policy-making, as non-Indigenous policymakers are often less aware of the real conditions and challenges in schools in Indigenous areas.

User-centered design can help put an EdTech solution into practice

This research helped us identify user needs and expectations related to mother tongue education and technology. Exploring the constraints and opportunities of technology, teachers' current perceptions, practical barriers and other related factors helped uncover the various aspects needed to make an ICT intervention suitable and successful. The following considerations can help language technology developers and others to design tools that help improve educational outcomes for Marma children:

Table 2: Considerations for developing language technology in Marma for MTE

Factor	Considerations
Development of language technology	• Language technology is a powerful tool that can help both teachers and students learn and improve proficiency in Marma. Speech to text and text to speech solutions are widely and successfully used in EdTech for majority languages • To achieve the same in Marma, language data in Marma needs to be high-quality and in audio format • Any language technology should be tested in different parts of the CHT with speakers of different dialects of Marma to test suitability
Interactive learning tools for teachers	• A user-friendly tool that incorporates text-to-speech and speech-to-text would help Marma teachers and students improve their literacy • Design should consider features and functionality for both multilingual and monolingual settings • Aspects such as an offline mode could help reduce challenges like connectivity and literacy barriers • Audio-visual content is an engaging way to motivate and make learning fun and interactive for younger children • Teacher-student co-learning would help embed MTE
Teacher skill development	• Incorporating tools powered by language technology into existing digital platforms like Muktopaath can support teachers to access specialized Marma training • Training on existing tools and material should be developed and promoted • Such platforms also offer scope to develop a variety of training modules, such as content on pronunciation, tone, and grammar
Partnerships and sustainability	• Partnerships in the EdTech sector and with organizations in the CHT can help promote initiatives and ensure ownership and sustainability

Annex 1: Methodology

This report summarizes research carried out using a mixed-methods approach in a baseline study and a user research study. Data was collected between 15 May and 12 July 2024.

Baseline research

The baseline study aimed to explore the culture, history and language of the Marma community, as well as challenges Marma community members face in different aspects of their lives. We used the following methods:

- **Key informant interviews:** We spoke to 11 Marma community leaders, teachers and experts. Eight were from Khagrachari and 3 were from Bandarban. Two interviews were in-person; the rest were via Zoom. Interviews were in Bangla, Marma or English according to the interviewee's preference.
- **Focus group discussions (FGDs):** We conducted eight FGDs with a total of 47 participants. We conducted two FGDs (one for men, one for women) with each of: teachers, youth (18-25), parents (26-40), and older community members (40+). FGDs were in Bangla or Marma.
- **Secondary data analysis:** We analyzed several quantitative sources, primarily the 2022 national census from the Bangladesh Bureau of Statistics. This census data reveals significant population and household variations across the 11 districts of the Chattogram Division, offering insights that are crucial for understanding the socio-demographic dynamics of the CHT. There was limited qualitative secondary data available as little research has been conducted on the Marma community in the CHT or the Marma language. In total, we reviewed over 20 documents and datasets.

User research

The user research study aimed to understand challenges teachers are facing with mother tongue education for Marma students. It also explored how Marma teachers perceive and currently use technology, how technology could help in education, and what challenges would prevent Marma teachers being able to implement technology solutions. We used the following methods:

- **Key informant interviews:** We interviewed nine teachers and five other stakeholders (four education officers and one civil society representative). The teachers had a range of Marma literacy. Four taught in multilingual schools and five taught in monolingual schools. The other stakeholders included members of district educational authorities, a teacher trainer, and an expert involved in creating Indigenous-language books.
- **FGDs and interactive co-creation sessions: We conducted three FGDs:** one with teachers from multilingual schools, one with teachers from monolingual schools, and a mixed one including teachers from several settings as well as NCTB writers and civil society. In total we spoke to 26 people. They had a range of Marma literacy. Each FGD included a co-creation session in which the participants shared ideas and inputs on potential solutions and we developed user personas and journeys for teachers who want to better use Marma in their classrooms. This discussion also aimed to explore the challenges of creating teaching material in Marma from a linguistic perspective. Language technology solutions are reliant on understanding linguistic aspects of the language in focus, for example level of standardization in writing and pronunciation.

- **School visits:** We visited two schools in rural areas and a digital lab in Khagrachari town. This helped us understand the quality of infrastructure, available resources, environment, and potential for using digital centers for future access to digital tools developed under this project.

Limitations

- **Geographic scope:** Primary data collection focused largely on Khagrachari District. The challenges Marma teachers face in Khagrachari, such as travel difficulties (Selim 06/06/2017), limited infrastructure, remoteness (Sohel, 2014) and lack of support, no scheduled routines, limited training, and multitasking, mirror those in the other two districts of the CHT (Ramhan, 2020). So, the findings are still relevant for understanding the situation for Marma speakers throughout the CHT, but they cannot be considered to represent the full diversity and experiences of the Marma community. To mitigate this limitation, we triangulated with secondary data sources and consulted Marma speakers from other areas.
- **Timing of data collection:** Field work was conducted mostly during the school vacation, so we could not observe in-person classroom teaching. Collecting observational data in a future study would further support user-centered design.
- **Limited secondary data:** Many sources of national survey do not enable disaggregation by first language. We could only analyze quantitative data for the geographical areas where Marma speakers are in a majority or sizable minority, rather than obtaining specific indicators for the Marma-speaking community. The scarcity of existing qualitative literature on the modern-day Marma community and Marma language highlights a broader gap in academic and practical knowledge about the Marma people. While this study contributes to that body of knowledge, it was unable to draw on extensive prior research.
- **Potential biases:** As participants may have been more likely to engage due to their positions or interest in the project, this could affect the representativeness of the data, which may not fully capture the views of marginalized or less vocal groups within the community.
- **External factors.** Due to the sudden disruption in internet access in Bangladesh we could not conduct KIIs with all relevant stakeholders (from a2i, the Ministries of Education and ICT). We plan to pursue those interviews at a later point. One user research FGD took place in a rural school without multimedia access, which hindered the intended demo presentation. As a result, the demo was recorded on a mobile device; while the participants could view it, they were unable to engage and interact with the tool. We planned to capture experience of, and access to, Marma language teacher training using the available textbooks, in order to explore how a technology solution might support, scale and increase the reach of that training. However, it was difficult to identify enough participants that have received or enrolled in the training, as very few teachers have actually received it.

How CLEAR Global can help

CLEAR Global's mission is to help people get vital information and be heard, whatever language they speak. We help our partner organizations to listen to and communicate effectively with the communities they serve. We translate messages and documents into local languages, support audio translations and pictorial information, train staff and volunteers, and advise on two-way communication. We also work with partners to field test and revise materials to improve comprehension and impact, and to develop language technology solutions that work for communities. This work is informed by research, language mapping and assessments of target populations' communication needs.

We also provide training to support effective humanitarian communication (topics include humanitarian interpreting, communication in emergencies, and plain language). For more information visit our website or contact us at info@clearglobal.org.

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