This study evaluated the effectiveness of a CBW delivered speech correction program for children with CLP in Cuddalore and Thiruvannamalai districts in Tamilnadu, India. These sites were selected as there existed an ongoing community based cleft care project providing comprehensive management for individuals with cleft lip and palate in these two districts. A training module to provide knowledge and skill to CBWs on delivering speech correction program for stop consonants under the supervision of SLP was developed and its effectiveness was evaluated. Focus group discussion approach was used to understand perceived needs related to speech by the caregivers in their children with CLP and obtain an estimate of needs related to speech in children with CLP in the community. The effectiveness of the program was reported based on i) speech outcomes from CBW and SLP delivered speech correction program, ii) follow up for intervention, iii) cost for travel/time incurred towards availing speech correction program, and iv) perception of caregivers of children with CLP who received speech correction program through CBW.

A training module with a handbook for CBW in Tamil language was specifically designed to provide required knowledge related to CLP and its speech characteristics, principles and methods in correction of articulation errors in children with CLP and skills to identify errors in placements restricting to stop consonants in children with CLP. The contents of the material were reviewed for technical and linguistic appropriateness by a speech language pathologist experienced in CLP and a linguist. The training program was conducted by the investigator through didactic lectures using the materials (power point presentation complementing the contents of the handbook, animated videos on speech production mechanism and audio video samples of speech errors in individuals with CLP) and demonstrations.

Eight CBWs from Cuddalore (05) and Thiruvannamalai (03) were recruited for the study and completed the training module. Entire training module was designed and delivered over four sessions of six hours each and implemented in two parts (two sessions per part) with a gap of one month. Part 1 of the module focused on providing knowledge about cleft, process of speech production, cleft speech characteristics and skill in listening and identifying atypical patterns of articulation in individuals with CLP. Only those CBWs who obtained 70% scores on both knowledge and skill in the
post assessment following part 1 participated in part 2 of the training module. In part 2 of the module, principles of speech therapy and techniques applied in correction of speech sound errors of stop consonants in individuals with CLP were covered. Only those CBWs who obtained 80% score in the evaluation three months post training were recruited for implementing the CBW delivered speech correction program. Pre and post training assessments of knowledge and skill were measured to analyse effectiveness of the training program. All CBWs obtained above 80% score in the overall training program. The developed training modules were effective in providing the knowledge and skill required for implementation of speech correction program for stop consonants in individuals with CLP under direct supervision of a SLP.

Needs related to speech perceived by caregivers were documented using focus group discussion. Fifty-five caregivers of children with repaired CLP in the age range of 5-12 years participated in six FGDs conducted in both the districts by the investigator. Thematic analysis was carried out using grid tables. Verbatim transcriptions of few caregivers were extracted in each theme for better understanding of the responses. From the responses, it was clear that the caregivers were aware of issues related to speech in their children with CLP. However, they did not avail speech therapy services nor could learn the skill sets required for implementing a home plan citing various logistics reasons.

For estimation of needs related to speech, speech assessment camps were conducted in both districts by the investigator. The CBWs communicated about the scheduled camps to all potential beneficiaries in the districts. The investigator completed the assessment and recorded speech samples at camps organized in the respective districts. All caregivers were explained about the purpose of the assessment and the study process prior to obtaining consent. The speech sample including general conversation, syllable repetition ([papi], [tati], [kaki], [sasi]), word repetition, sentence repetition, and number counting (1-10 & 60-70 in English) was audio and video recorded and perceptually analysed by the investigator for profiling speech. Absence of error pattern was scored as ‘0’ and presence of an incorrect production was scored as ‘1’.
Analysis revealed that a major group of participants in this study exhibited some form of speech disorder requiring speech intervention. Speech intervention was indicated in 165/180 participants. The most common error pattern, backing to glottal (Glottal stops) for stop consonants [k], [t], [ʈ] was observed in 151 participants. From a cohort of 400 individuals with CLP in both the districts, 97 participants were recruited for speech correction program. Information obtained from the assessment process was used for recruiting participants for the speech correction program. It was ensured that only those who had adequate language development and exhibited compensatory articulation errors with adequate structure for speech were enrolled in the speech correction program.

The districts were divided into smaller clusters based on geographical location of participants’ residence and nearest available CBW. Within each cluster, participants were randomly allotted to SLP delivered or the CBW delivered speech correction program. Speech correction program was delivered by trained CBWs and SLP (Investigator) at the community in both districts. The CBW delivered the program either at the participants’ house/school while the SLP delivered it in the community at a conveniently located hospital and block resource centre. The speech correction program lasted for a period of 09 weeks per participant with a maximum of two sessions per week. Each session was provided for duration of 30 minutes. The delivery method, process, duration and frequency of speech correction sessions were kept constant for each participant in both SLP and CBW delivered speech correction program. The speech correction goal was set for each participant in both by the investigator based on the pre-intervention analysis. Their progress was reviewed periodically and a target of 70% consistency was set as criteria to consider as correct production. The entire program was completed by 74 participants, which included 37 each in CBW delivered and SLP delivered speech correction program. Speech samples were recorded periodically to analyse outcomes of the speech correction program.

Samples of only those 74 participants who completed the speech correction program were considered for analysis. For analyzing outcomes, the speech sample collected during pre-no-intervention phase, immediate post-intervention and follow up post-
intervention phase was analyzed. Speech analysis were carried out by three experienced (in evaluating cleft speech) SLPs independently transcribing the speech sample consisting of word and sentence repetition and rated each token of the sample based on presence or absence of error production. Absence of error pattern was scored as ‘0’ and presence of an incorrect production was scored as ‘1’. In total, 11,988 tokens (44 words+10 sentences from each sample) were analyzed. All the evaluators were given a standard operating procedure for completing the evaluation.

Thirty-seven participants each completed speech correction program delivered by CBW and SLP at the community. In both the SLP and CBW delivered speech correction program, majority of the participants demonstrated progress and maintained learnt productions even after 03 months’ post intervention. Among the speech sounds, [k] sound demonstrated maximum movement from abnormal production to correct production. It was observed that changes in sound production were comparatively less achieved by CBWs when the participant had error in more than one sound. Time taken to achieve correct consonant production and generalize productions in both models of intervention was also analyzed. Establishing a correct production took same time in both models however, CBWs required 2 to 3 sessions more than SLP to generalize the productions to word and sentence level. Overall findings of the study revealed that participants in the CBW model showed similar patterns of progress compared to participants who received intervention through SLP.

Initially, the SLP delivered speech correction program was conceptualized at the tertiary care hospital. Maximum attrition of participants was present in this scenario with none of them following up for subsequent sessions. Even when the speech correction program was provided in the district by the SLP, 15 participants dropped out. When analyzed, the reasons cited were common and relating to logistics. In CBW delivered speech correction program, 08 participants discontinued citing reasons related to convenience of time and social attributions. They did not want their children availing speech service from a stranger close to their residence as they felt it was attracting unnecessary attention to the family from the neighbours.
Care givers were probed about their perceptions of the CBW delivered speech correction program. All the caregivers responded positively when probed about the speech correction services provided by CBW at their homes or schools. They all reported that this is the first time their children received continuous speech correction sessions facing minimum or no logistics challenges. They all reported that their children showed improvement and they were able to avail the services continuously as this service was provided in their village itself. The biggest advantage was that the children and the caregivers did not require taking leave from school and work respectively. Few caregivers suggested that it would be even better to conduct such programs in partnership with government agencies or school authorities.

In this study, the intervention program was limited to correction of errors in stop consonants, was executed by CBW under the direct supervision of SLP, and all decisions related to intervention was made by the SLP. Most of the participants who achieved \( \geq 70\% \) accurate production improved to get 95-100\% correct production beyond the study period. The results of this study suggest that this model could serve as a viable model of intervention in places where the needs are more and services of SLP are minimal. There were challenges in executing this study in terms of retaining the trained CBW, identified child/participant needing dental or any other allied treatment, migration of entire family of the identified participant, availability of space and permission in homes and schools to carry out the project and most importantly availability of trained listeners in the local language to evaluate the speech.

The fundamental aim of community based programs is to provide services at venues as close to the individuals requiring services as possible. This could be homes, or schools or other centers close to the child. While penetration of technology facilitates better networking, it is yet to translate into delivery of services such as speech, specifically in rural areas. For implementation of such programs, a dedicated training module, repeated training programs for CBWs, careful selection of CBWs and participants, design of an intervention module involving appropriate techniques, intensity and reinforcement to ensure application of behavior modification strategies for correction of speech is required. It is vital to design resource materials and
delivery of training program for CBWs who would deliver the speech correction program to selected children under close supervision of SLP.

This study was possible, as this was part of a broader project (SRMC-TF) providing comprehensive management (speech, hearing, & dental) related services in these two districts supported by Transforming Faces, a Canadian based nonprofit organization. This model was feasible only because of the availability of funding to provide a minimum reimbursement to the CBWs who are also involved in other activities of the projects like, identification of individuals with CLP in the villages, networking with government and non government organizations for conduct of sensitization programs in the community, counselling of family regarding intervention, coordinate and conduct dental and orthodontic camps, networking with the tertiary care hospital cleft care centre to fix appointments for new patients identified during the field visit, conduct of middle ear screening program for identification of middle ear disorders, follow up patients for fixing appointment with ENT surgeon for medical/surgical intervention for middle ear related issues, etc. This was possible with the support from schools which allowed the students to avail speech therapy services, permit the CBWs to enter their premises; and parents who offered to organize travel for the CBWs to reach their residence from the nearest place of available public transport. The community engagement during focus group discussions wherein the caregivers expressed their needs and challenges in accepting these services was very vital in conceptualizing this program.

This model dependent on local human resources was sustained due to available dedicated resources at the community. Robust interaction of government and non governmental agencies to share human resources is imperative in such models. Providing speech and hearing service coverage to the last mile is most beneficial for patients both financially and logistically. Tertiary care hospitals and institutions offering speech and hearing programs and local administration (government organizations) should utilize a public private partnership model. The approach used in this study can be utilized for has service delivery for children with other speech language disorders also. The increasing penetration of tele-technology is another opportunity to strengthen networking between specialist, community worker and the
Summary & Conclusion

patient in the remote location. Detailed study of availability of network, bandwidth and implementation of dedicated intervention hub which can handle the requirements for providing speech therapy in rural areas is another possible solution. The inferences of this study highlight the feasibility of implementing an alternative model of service delivery in regions where the professionals are not available or few in numbers. It was also evident from the study that stakeholders’ views are vital in acceptance and success of such novel models. Going forward, collaboration with agencies/ institutions and infusion of technology will be the key elements in extending services to the underserved areas.