EVALUATION OF

“CASCADE STRATEGY” FOR TRAINING OF HEALTH CARE WORKERS FOR IMMUNIZATION PROGRAMMES

AN ANALYTICAL LITERATURE REVIEW

Prof. Dr. Zafer Öztek
ICC Consultant

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International Children’s Center - (ICC) is a civil society organization which aims to advance health and human rights of children, women, families and communities worldwide through advocacy, research, training and capacity-building. ICC was designated as a WHO Collaborating Center in 2010.

Prof. Dr. Zafer Oztek, is a professor of public health and paediatrics at the Hacettepe University, Ankara, Turkey. He served as the General Director of Primary Health Care in the Turkish Ministry of Health. He has over 40 years of professional experience and has worked as an advisor / consultant to WHO, Unicef and the World Bank in many programs.
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EXECUTIVE SUMMARY

Although important progress has been achieved in controlling communicable diseases, many vaccine
preventable diseases are still threatening health of people living in low income countries of the world.
The common goal of the WHO and all countries is to raise the immunization rates to its maximum
levels and eliminate the life-threatening communicable diseases.

In order to raise the immunization rates, the WHO and countries are taking several measures to ensure
health services available and accessible for everybody, a reliable cold chain, sufficient budget etc.
Along with these strategies, continuous training of professional vaccine providers, health care
managers and volunteers is crucial.

Even if these health workers are trained in pre-service and/or before they start working in the
immunization programs, all immunization personnel need in-service training as well as. They have to
update their knowledge and skills according to the new advances (vaccines and technologies) and new
strategies in the immunization programs. The critical question is how best to train the health staff.

There are two main approaches in training the staff: Direct and indirect (cascade training). In
the direct approach, the central trainers (master trainers) reach the peripheral providers and train them
directly. This approach can be effectively implemented in small regions where there is few working
staff, but this is not applicable in populous regions. In large, highly populated and low income
countries, cascade training approach is more rational in order to train more staff in less time. In
cascade training central training is provided by a master trainer, to trainees. These trainees then act as
trainers and pass the content of the training course onto others, usually in another training session.
This transmission method may be carried on for several cascade layers; the fundamental idea is to train
a large number of people, in a relatively short time and at relatively low cost, as trainees become
trainers in their own regions.

There are some important disadvantages of this strategy for example concepts at the top of the
cascade do not meet the needs of teachers at grassroots level, dilution of the initial training so that the
recipient receives scant benefit, misinterpretation of the centrally thought issues by the trainers or
misunderstanding by the end providers - this is also defined as “Chinese whispers effect”

Due to some important disadvantages of this strategy, it is important to reconsider the cascade
approach in order to strengthen it and complement it with alternative ways for training health staff.

In the literature review, covering last 20 years literature it was found that the cascade training strategy
has been successfully implemented in many countries as regards to immunization programs. Although,
some disadvantages and ineffective results have been observed, it is very clear that because of the
advantages to planners in terms of low costs and human and material resources, cascade training
programs will remain for some time to come. Yet, it is often not the cascade training model which
does not give optimal results, but the manner in which it is implemented.

The literature review reveals that if the cascade training strategy is well planned, carried out by
blending appropriate teaching techniques (such as distance learning, coaching-mentoring, on the job
training, skills oriented, problem-based and supported with audio-visual teaching methods) and is well
monitored/supervised during the implementation phase, it can be an effective strategy for training
health care staff and managers. In other words, the classical cascade training strategy has to be
improved and strengthened with additional strategies so that it can be used more effectively.

A new approach termed “cascade plus” is being proposed to differentiate from our traditional
understanding of cascade approach. Cascade plus is defined as “a well-planned and implemented
cascade training strategy with an understanding of holistic approach to the communicable disease
control and immunization programs, practice oriented, flexible, done using multiple training
techniques, supported with effective supervision, monitoring, process evaluation and problem solving
deliveries.”
1. PURPOSE OF THE REVIEW

The purpose of this review is to:

- Evaluate training approaches commonly used to train health care managers, health workers and any other staff involved in the immunization programs.
- Determine the effectiveness of different training strategies and models, with special emphasis on cascade training strategy.
- Review cascade training approach employed in different fields and sectors and find out possible implementation of alternative strategies in place of cascade strategy or how the cascade approach can be improved and be more effective in the immunization programs.

2. METHODOLOGY OF THE REVIEW

At the request of WHO, a comprehensive literature search was conducted including articles, reviews, reports and e-information on the training strategies, especially the cascade strategy and also possible alternative approaches like blended model.

At the inception stage a comprehensive literature screening were conducted with the assistance of the WHO – HQ and national university libraries in Turkey. The key words used for the screening were “cascade training, training of trainers, pyramid training, in-service training, adult training, staff training, training of health staff, training strategy, training model, blended training, distance learning, e-learning, training on immunization, training techniques.” Thus, a list of over thousands of articles, reports, books and electronic records were handled.

These listed publications after pre-search were screened further by their titles first and then the publications possibly related to the task by their abstracts. At the end several hundreds of publications possibly related to cascade training in general and training of health staff on immunization were listed. At the final stage of screening, these publications were evaluated by their contents; in the meantime the reference lists of publications were also evaluated and those directly related to the topic were also listed. Finally, 124 publications were identified, classified and their key points and messages used in writing the review report.

The review had some methodological limitations due to relatively few publications specific to training in the immunization sector, but on the other hand there are numerous numbers of articles regarding the use of cascade strategy in other fields such as training of school teachers, voting system personnel etc.

Several reviews and evaluations have been carried out about cascade and blended training delivery; these papers contribute to understand the advantages and disadvantages of the training strategies and form the backbone of this review. The numbers of the publications reviewed are provided in Table 1.
Table 1: Reviewed publications and personal communications (List of References)

<table>
<thead>
<tr>
<th>Type of publication</th>
<th>Number</th>
<th>Directly related with training strategy or model</th>
<th>Indirectly related with training strategy or model</th>
<th>Related with immunization programs, but not training</th>
</tr>
</thead>
<tbody>
<tr>
<td>Review articles</td>
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<td>1</td>
<td>2</td>
<td></td>
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<tr>
<td>Research articles</td>
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<td>1</td>
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<tr>
<td>Other articles</td>
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<tr>
<td>Miscellaneous (Books, reports, e-sources etc.)</td>
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<td>5</td>
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<tr>
<td>Grand Total</td>
<td>132</td>
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In addition, electronic messages including four questions (see annex 1) were sent to 8 internationally well-known experts and also they were interviewed through teleconference to obtain their views and experiences about the training methodologies they have implemented for the immunization programs, their opinions on the cascade and alternative approaches, and the pros and cons of the methods they implemented. The list of the experts interviewed is below (in alphabetical order):

1. **Roberto Balsamo** (Global Learning and Performance Management, WHO, Geneva, Switzerland)
2. **Fiona Braka** (Immunization Focal Point Expert, WHO, Ethiopia)
3. **Angela Kydd** (Senior Lecturer, University of the West Scotland, Paisley, Scotland)
4. **Christopher Morgan** (Principle Fellow, Centre for International Health, Burnet Institute, Australia)
5. **Renu Paruthi** (RI-Training Focal Person, WHO-NPSP, New Delhi, India)
6. **Lora Shimp** (Senior Technical Officer, USAID, Washington, DC, USA)
7. **Steven Stewart** (Health Communication Specialist, CDC, Atlanta, USA)
8. **Barbara Stilwell** (Director of Technical Leadership, Intra Health International, USA)

Finally, the author’s views and the suggestion of a training approach named as “cascade plus training” for immunization programs are given in the conclusion.
3. INTRODUCTION

The vision for the Decade of Vaccines (2011–2020) is of a world in which all individuals and communities enjoy lives free from vaccine-preventable diseases. The mission of the Decade of Vaccines is to extend, by 2020 and beyond, the full benefit of immunization to all people, regardless of where they are born, who they are or where they live. In the last 10 years, great advances have been made in developing and introducing new vaccines and expanding the reach of immunization programmes. New and increasingly sophisticated vaccines that have become available in the last decade, including pneumococcal conjugate vaccine and vaccines against infection with rotavirus and human papillomavirus, are currently being rolled out globally.

Despite this progress, vaccine-preventable diseases remain a major cause of morbidity and mortality. Adoption of new vaccines by low- and middle-income countries (where disease burdens are often the highest) has been slower than in high-income countries.

The increasing complexity of immunization programmes and ambitious new goals, mean that more trained health workers are needed to manage the increased burden of work, including programme managers at the national and sub-national levels as well as front-line workers who deliver services and interact directly with communities. Front-line health workers, who deliver not only vaccinations but also primary health care interventions and health education, need coordinated, comprehensive and very practical pre- and in-service training, with updated, relevant curricula and post-training supervision. Health-care workers need to be able not only to explain why immunization is important, but also to give advice to individuals and communities on nutrition, create a healthier environment and recognize the danger signs when someone falls ill. Immunization programmes should ensure that this training and supervision is effectively extended to community-based health workers. (1)

4. TRAINING THE PROVIDERS

Good training can yield dividends in terms of improved work performance, efficiency, increased impact, and a healthier community. Training is not a quick fix but rather a basis for sustained development of human resources. (2)

Shefer et al (3) defines provider education as providing information about immunizations to immunization providers. Provider education is based on the assumption that provider knowledge about vaccination will have an impact on the worker’s behaviour in a positive way. Provider education can motivate providers to educate patients / people, as a result parents are more aware of and demand vaccination; provider education can also motivate providers to implement other interventions such as reminder recall systems or standing orders.

Morgan and Deutschmann (4) stated that, training of health care managers and health staff is a crucial strategy for EPI and it has increasingly turned into an important tool for rural development mainly in the low and middle income countries. They also pointed that according to their experience; training of health workers is an indispensable part of health development and without training development fails. (4)

The training needs of health staff differ according their educational level and their working place. Especially the training of both high and mid-level managers is the key factors in achieving the immunization targets (5, 6) and there are evidences, that if the mid-level management training is done the performance of the trained staff increases and therefore it contributes to the improvement of immunization coverage rates. (6)

The question is how best to train the health providers?

According to Morgan and Deutschmann (4) a good portion of training is done through cascades. However, there has been scepticism on the effectiveness of this mechanism. (7) Due to existing scepticism, one needs to review how to assess the impact of staff training, especially when the cascade model is used.
It is hoped that, this literature review and assessment will contribute to the improvement of training approaches of health staff in immunization programs.

5. CASCADE TRAINING

Cascade training is also referred to as “pyramid training”, “training the trainers” or “training for trainers”. Cleese defined it as “a series of training processes, each occurring as the result of the one before”. Cascade training is a common strategy in conducting training aimed at change. It suggests more than one training program directed at those employees involved in changes, where critical change-related information will flow through the enterprise in a planned way, to establish an alteration or modification as an accepted part of the organization. At its simplest, cascade training can be described as training where one individual is sent on a training course and then expected to cascade the information and training to others.

Cascade training is implemented widely in many types of organizations. It is used extensively in the spheres of both education and health and is frequently adopted by non-governmental organisations (NGO’s) as an acceptable training method. In cascade training central training is provided by a master trainer, to trainees. These trainees then act as trainers and pass the content of the training course onto others, usually in another training session. This transmission method may be carried on for several cascade layers; the fundamental idea is to train a large number of people, in a relatively short time and at relatively low cost, as trainees become trainers in their own regions.

![Two levels cascade training model](Adopted from McArthur and Yoosabai, Ref. No: 16)
5.1. The Growth of Cascade Training

The first reported use of cascade training was in job instruction training programs undertaken during the Second World War.\(^{(17)}\) Its popularity increased again in the early 1980’s as several organizations adopted this approach as part of a total quality management strategy.\(^{(18)}\) The success of such an approach was acknowledged and was utilized by both governmental organizations and NGOs. Cascade training is traditionally accepted as a top down approach but during implementation it may take any of the following four designs; hierarchical, process, employee role and project:\(^{(8,19,20)}\)

- In hierarchical; training usually starts with upper management levels and moves downwards through the ranks of employees.
- In process design; training follows the chain of cross functional relationships that suppliers and customers have in a business.
- In role design; cascade training follows the line of peer relationships across the organization. Having peers instruct their peers offers unique opportunities for increasing training effectiveness.
- In project design; training follows the interconnections of groups, both internal and external to the organization, which are all working toward achieving a common goal.

In the course of cascade training, these basic designs are often combined when needed.

5.2. The Advantages of Cascade Training

Cascade training is a very common, a real world practice\(^{(8,11,12,21,22,23,24)}\) which is widely used with the aim of providing training to the maximum number of people in a cost effective manner. It has a number of theoretical benefits which make it attractive to planners of change on a large scale. The advantages (pros) of cascade training strategy are stated in the literature as below:\(^{(8,22,24,25,26,27)}\)

a. It appears to be cost effective.

b. Through use of small groups it enables fully participative competency training.

c. It requires few logistical resources, as the bulk of training can be locality-based (field based).

d. It requires few central organizational resources – though a significant organizational load is spread over a large number of locations.

e. It does not require staff to take long periods out of service, and it uses existing staff as co-trainers.\(^{(21)}\)

f. It is sustainable that has only moderate demands on professional training resources. This seems especially relevant in many international contexts where such a strategy is employed, as the numbers ultimately needing training are large, and also in circumstances where the funding to provide training is limited.\(^{(22)}\)

g. It is time efficient. It can train a large number of people in a relatively short period. Though, some time for absorption is required between being trained and conducting training for others.\(^{(27)}\)

h. It is empowering and capacity building, in delivering transportable training skills to a large group of people at each level. It helps to build regional and local capacity and strengthen regional network.\(^{(27)}\)

i. It is decentralized, allowing local accountability.

j. Reinforcement, through conducting training sessions for others, will enhance skill levels.
5.3. The Disadvantages of Cascade Training

Besides its advantages, the cascade strategy has some disadvantages (cons) as well. Because of these disadvantages, a number of authors\(^8,24,26,28,29,30,31\) have criticised cascade training and the question of either finding appropriate solutions for these disadvantages or think of alternative strategies was raised.

The disadvantages of the cascade strategy are listed below:

a. Concepts at the top of the cascade do not meet the needs of teachers at grassroots level\(^26\)

b. The higher levels often lack experience of the grassroots’ practices\(^24\)

c. Dilution of the initial training so that the recipient receives scant benefit\(^26\)

d. Misinterpretation of the centrally taught issues by the trainers or misunderstanding by the end providers - This is also defined as “Chinese whispers effect”\(^28\)

e. Quality of teaching at grassroots level unable to achieve the objectives of the program\(^26\)

f. Success depends on quality of the trainers\(^26\)

g. Cascade training is mainly for training the technicains. In case of using for the training of professionals, such as school teachers, it de-intellectualises the practice (or the profession)\(^29\)

h. It is constructed according to a centre-periphery and top-down structure, so that it is too inflexible to respond to the needs at grassroots level\(^30\). A top-down approach does not encourage participation and commitment. Consequently a justification of the new ideas which need to be transferred in order to change behaviour hardly takes place\(^24\). Evans\(^31\) believes that “bottom-up approach” is ideal as trainees get an opportunity to make inputs as far as the training that they receive is concerned. Unlike the “top-down approach” where trainees cannot make inputs pertaining to their training.

According to “ACE Electoral Knowledge Network” paper,\(^25\) the difficulties of cascade training strategy are listed as below:

a. It requires a large number of non-professional trainers capable of having training skills - and confidence in their own training skills - developed in a relatively short training session.

b. It requires detailed development of trainer’s manuals, lesson plans and presentation resources.

c. Non-professional trainers may not be able to make effective training use of group activities.

d. May be difficult to revise training session content or presentation style in accordance with evaluation findings.

e. It requires central monitoring to ensure that sessions are in fact organised and conducted as planned.

f. Staff selected for other skills may not be effective trainers/presenters.

g. Time period strictures may compress the levels to the stage where small group advantages are lost.

h. It requires a longer training session for a significant number (but a minority) of staff who will, in turn, train others.

In the same paper,\(^25\) it is expressed that there is less control over quality and consistency. The constant and effective monitoring required to ensure that the correct messages are passed on in effective ways at each level of the pyramid (see figure 1) may be beyond management body capacities.
5.4. Evaluations of Cascade Training

In the literature, it seems clear that the most evaluations of cascade training only deal with the first stage of the cascade, which is the evaluation of the impact on the trained staff, rather than evaluations on those who will be trained by the trained staff or those staff for whom the trainings are designed to make an impact. Many studies explore the reactions of trainers to the initial teaching, their preparedness for further teaching, even including their opinion on how they got on when teaching others; Yolsal et al, Nicolaidis and Mattheoudakis, for example. Rubak et al conducted a similar evaluation of how a 3-day 'Training for Trainers' course elevated the doctors' knowledge, teaching behaviour and clinical learning climate with pre, post-and long-term measurements. Rubak et al also found that teaching behaviour significantly changed with the introduction of feedback and supervision.

Evaluations on the overall impact, and the staff trained by the trained trainers are both less in number and difficult to interpret. Herschell et al carried out an extensive review examining therapist training in the implementation of psychosocial treatments. They were only able to find 3 evaluative studies of cascade training programmes in their field. All reported better outcomes about trained staff not about the staff next step down in the cascade. Studies which aim to evaluate the staff whom the cascade is designed to impact upon, highlight the large number of potential confounding variables, for example, the format of the training, resources available locally, relationship of the trainers to those they train, audience characteristics etc. that makes cross comparison between studies very difficult. Connell, Holmes, Voelkl and Bakalar and Pelto Goncalves, Victora, Martines and Habitch. Many large scale programmes employing cascade training, perhaps as a result, evaluate the impact of the programme overall against what it was hoped the program would achieve. For example, Basri et al observed health worker training for tuberculosis control in Indonesia; Stanback et al looked at improving adherence to family planning guidelines in Kenya. As with most studies of this type and scale, the reported results of the training effort is very positive but again it is difficult to interpret whether this is down to the impact of cascade training alone, or whether other variables, including the ‘Hawthorne effect’ play a role.

According to McArthur and Yoosabai, the cascade model is based on the assumption that knowledge and skills can be conveyed from a centre to the margins and that the transmitters will not change that knowledge or the meaning of the message. As Roberts states, however: …cascade may work if the message is strictly informational (for example about a new exam) but is liable not to work as intended if the message involves new practices based on new assumptions, theory and values.

Initial training can often become diluted as it moves down the tiers of trainers; trainers need to accept that practising teachers have knowledge, experience and theories of their own and any new input will be “reinterpreted by teachers to fit their own beliefs and concerns…” The original message often changes as it cascades on, sometimes dramatically.

Typically at the top of the training levels are the ‘master trainers’ who cascade down to larger numbers of teachers. These master trainers are usually the ones trained by the ‘outside expert’, who then disappears from the city/country and is no longer on-hand for questions or monitoring of the cascading, leaving behind ‘trainers’ who are now expected to cascade knowledge that they perhaps do not fully understand. On the other hand, experts who had positive experiences with external trainers taking part in the master training groups. These experts believe that the external trainers have valuable inputs in preparing training curriculum, manuals and also guiding and supervising the local trainers in the master training groups.

In the literature, there are a number of examples of projects on health and non-health areas on how effective the cascade training is.

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1 A term referring to the tendency of some people to work harder and perform better when they are participants in an experiment. Individuals may change their behaviour due to attention they are receiving from researchers.
In a project implemented in Uganda, health workers from 21 health facilities were given a one-day central training on the use of rapid diagnostic tests (RTDs) in malaria case management, including practical skills on how to perform read and interpret the test results. Successful trainees subsequently integrated the use of RTDs into their routine care for febrile patients at their facilities and transferred their acquired skills to colleagues (cascade training). A cross-sectional evaluation of the health workers’ competence in performing RDTs was conducted six weeks following the training, incorporating observation, in-depth interviews and the review of health facility records. All trainees passed the post-training concordance test with (greater than or equal to) 80 % except 12 that required re-training. Six weeks after one-day training, 80 % of the health workers accurately performed the critical steps in performing the RDT. These results were accepted as the success of cascade approach.

Another study was conducted in Indonesia about tuberculosis control. The National Tuberculosis Control Programme used a systematic process to develop and implement two strategic action plans focussing on competence development based on specific job descriptions. The approach aimed to shift from only focussing on training, to a broader, long term approach to human resource development for comprehensive tuberculosis control. A structured plan for capacity building, including standardized competency based training modules and curricula, was developed in the first phase. This was supported by an organisational system comprised of a training focal point, master trainers, and regional training centres in which nationwide training of supervisors was implemented. Training was expanded to the health service delivery level in the second phase, as well as broadened in the scope of activities beyond training to also include other aspects of human resource development. The result was improved technical and managerial capacity of health workers for tuberculosis control at all levels. The impact on case detection and treatment outcome was spectacular, with major improvements in quality of all aspects of service delivery. The strategic decision by the national program in 2000 to put the highest priority on capacity building has resulted in impressive progress towards tuberculosis control targets, a progress that despite many challenges has been sustained.

In a study conducted by Murphy et al, the effectiveness of training trainers was evaluated. This study was designed to determine the effect on their trainees' performance of instructing trainers in a specific cognitive training method. Ten trainers from a university teaching hospital were randomized to train novices on a one-to-one basis in a simulated procedure using either a four-step cognitive method or their own unspecified method. Thirty trainees were randomly assigned to either a cognitive or standard trainer. After training, trainees were assessed on performing the surgical procedure using a task-specific checklist, a global rating scale, and time taken to complete the procedure. Trainees who were trained using the specific cognitive method completed the procedure in a faster time (mean 331 seconds) versus 426 seconds and with higher global rating scores (mean 23.25 seconds) versus 20.5 seconds compared with those taught by a standard method. Instructing trainers in a cognitive training method, results in a significant improvement on training outcomes.

In a study conducted by Bates, a scheme of nurses was trained to deliver effective resuscitation training to parents discharged from the neonatal intensive care unit. A typical teaching session with parents is described, including the techniques used to deliver this teaching effectively. Outcome data of over a two year period, including parental feedback data was evaluated. The researcher concluded a structured and comprehensive resuscitation training session enables parents to leave neonatal intensive care unit with greater confidence, and can save lives. This study has shown that this package can be provided by appropriately trained neonatal nurses.

Giusti et al published their experience of how effective cascade training was in Italy. In 2004 the Italian Federation of the Colleges of Midwives implemented a cascade training project to train trainer-midwives who would then train midwives, either already working (Continuing Education) or during their formal academic education. Contents, techniques and methods have been the same as those adopted for the World Health Organization's 40+40 hours course "breastfeeding: counselling: a training course" for trainers. A total of 39 training coordinators and teachers of academic midwifery courses have participated, in two separate groups. In their turn, the trainers have trained 74 working midwives, from almost every Italian region. Throughout the training program, the trainers were supervised by two tutors who assessed their learning-teaching performance and provided a final
Certificate. The program allowed the trainers and the other participants to reach a standard level of knowledge on the issue, regardless of their initial knowledge.

As Toure et al (50) have stated in their article, the Democratic Republic of Congo has implemented a cascade training program in a conflict area where the local people and the immigrants were poor in reproductive health. In the first phase of the project a training team trained 60 trainers in reproductive health and established the training centres. Following the training of trainers, trainers observed and mentored the new trainers during their training sessions. As the authors underline, lessons for best practice can be drawn from the challenges that were encountered in the implementation of this training project: **Involvement of health authorities at all levels is crucial.**

**Effective training requires a politically supportive environment, a strategy, resources, appropriate guidelines and policies, job expectations, and motivation and feedback. Delays in procurement of supplies and equipment can delay post training follow-up supervision visits. An important element of competency based training is having the time to practice skills in a real clinical setting under supervision. Continuous support and post-training follow-up by supervisors are key elements for successful training. Clinical supervisors must have the skills to offer post-training follow-up and coaching to develop confidence in trainees and help them make improvements at their facilities. Traditionally, supervisors did not involve the process of problem resolution by supervisees, and problems persisted. Training health-zone supervisors in facilitative supervision improved the quality of the supervision visits, and supervisors now encourage staff to solve problems and take ownership of their work.**

In a study conducted in Michigan – USA, (51) 28 health care providers were trained as trainers on providing dementia outreach education to rural communities. These trainers trained 3276 rural residents in 223 training sessions successfully.

In the final report (8) of evaluating the training for trainers in palliative care and dementia by Kydd et al, the training was accepted as success. It is underlined that **this success has been related to a number of factors such as, a) high quality training material, b) delivery of the cascade training by experts to extremely competent individuals, c) the excellent support and encouragement to the trainers from the project, and d) the interactive forum type of sessions.**

In a literature review conducted by Shefer et al (3) two studies evaluating the effectiveness of provider education on knowledge and attitudes were mentioned; (52,53) both showed improvements on provider’s knowledge and attitudes after provision of provider education through 1) dissemination of national guidelines for hepatitis B and 2) implementation of an innovative problem-based learning protocol in medical schools. One study (54) which used a provider-oriented health assessment fact sheet on the chart did not result in any improvement in knowledge. As Shefer et al stated, the small number of studies, limitations in design and conduct, and variability in results does not allow us to assess the effects of provider education alone in changing provider attitude or vaccination coverage. However, provider education is a part of several effective multicomponent interventions including provider reminders, feedback, and multicomponent education.

Morgan and Deutchmann (4) stated that training and education of health workers remains an indispensable part of good health development in resource poor settings. However, **many past training programs have failed to achieve significant gains in health outcomes because of poor selection of participants, inadequate methodology, and/or the influence of external factors in the health system or social environment.**

Using trainers drawn from successive tiers of the cascade also has potential disadvantages, the principal one being dilution of the training—less and less is understood the further one goes down the cascade. As a result information is often “watered down” and misinterpretation of crucial information is possible. (55) Kydd et al say that, “yet, it is often not the cascade training model which is the problem, but the manner in which it is implemented. A prime cause of failure is the concentration of expertise at the topmost levels of the cascade, so cascading to the staff at the frontline becomes more complex.” (8)
Another criticism towards cascade training is after the initial training, many trainers lack of confidence, knowledge and understanding to manage the training process. Many evaluative reports of cascade training cite difficulties such as local conditions, strikes, lack of time, lack of resources (e.g. for refreshments), lack of facilities, etc. Along with underlining all of these practical difficulties, due to lack of interest, the trainers may be reluctant to hold workshops despite their preparation. It is important to understand the reasons of it for successful cascade training.

Weddell in response to these concerns indicates that there is a need for planners to design and implement relevant and contextually appropriate training for trainees, and secondly there needs to be a milieu that will support their post-training implementation attempts.

A good example of the kind of staff and organizational issue that impede cascade training is provided by Draper et al., reporting on Kent and Medway’s Primary Care and Acute Trust’s efforts to improve its “Safeguarding Adult’s” procedures. They recommended that following publication of No Secrets and the multi-agency involvement required for adult protection. Senior community nursing staff were asked to volunteer for a “train the trainer” cascade. Although many staff attended the sessions, robust implementation of the second phase’ local awareness training depended upon localities and the interested staff. As a result implementation was consequently inconsistent and some trained staff did not deliver any training. There was also no overall management responsibility, no database on those staff attended any training, and no quality assurance on how the cascade trainers delivered the trainings.

A further cause of problems can be purely related to transmissive mode of training. In most countries schooling is characterized as using a —transmission model where teaching is telling, and learning is —absorption. Hayes and Weddell both point out that in-service teacher education where cascade training is frequently employed worldwide, a key factor present in the most successful programmes was less reliance on passive acceptance and the adoption of a more reflective teaching process; where re-interpretation of the training experience and consideration of the persons situation and work environment occurred.

According to Hayes there are a number of key criteria should be considered by the programme for the success of cascade training:

a. the method of conducting the training must be experiential and reflective rather than transmissive;
b. the training must be open to reinterpretation; rigid adherence to prescribed ways of working should not be expected;
c. expertise must be diffused through the system as widely as possible, not concentrated at the top;
d. a cross-section of stakeholders must be involved in the preparation of training materials;
e. decentralisation of responsibilities within the cascade structure is desirable.

Christopher J Morgan and Peter W Deutschmann had rather pessimistic experiences about the training programs. As they have pointed out in their article, for many years, the training and education of health workers has been a major feature of Australian health development programs in developing countries, and the fact that a South-East Asian health official quoted that old fish/fishing maxim indicates widening acceptance of this approach. However, major development donors are increasingly wary of funding such training. As they say they have explored the reasons for this trend and explain how these concerns can be addressed with an effective, evolving model for training and education in resource-poor settings. They stated a common fact that many health managers in resource-poor countries find it easier to visualise what they lack in health “hardware” (i.e. infrastructure and equipment) rather than their “software” needs of human capacity. Thus, training of health workers is seen as a less appealing option, a perception that may be more common in transitional economies such as those in East and South-East Asia. The other fact they have pointed was that in other situations, training was popular but for the wrong reasons; for example, when daily allowances paid by eager donors are used by participants to supplement the meagre salaries being paid to local workers.
Morgan and Deutschmann(4) also states that “cascade” approaches in-service training activities of this nature take time, resources and depend greatly on the quality of the teaching. Where resources have been limited, programs have used a “cascade” approach, where central, core trainers are trained well, once, and are then expected to train others, who then train others and so on. Cascade approaches have often failed, because it proves impossible to guarantee the training quality, which is so essential to success, throughout the levels of training. A shortened cascade, where external trainers implement training with local trainers, may be reasonable compromise, in case of widespread, rapid re-training required.

Morgan and Deutschmann(4) pointed out that training often fails for the simple fact that teaching does not equate with learning. There is a particular hazard that afflicts in-service training in resource-poor settings: when the “trained” trainer forgets that the rural health workers under his tutelage are adults, often with considerable skill and experience.

Sometimes, “training” fails because it is supplied where “education” is what is actually needed. The distinction indicates a more self-directed approach to learning, where health managers and health workers seek out resources to educate themselves, with the help of, or sometimes in spite of, external assistance. This is particularly appropriate for senior managers and for any health worker who is working in a complex situation requiring individualised solutions.(4)

According to “ACE Electoral Knowledge Network” paper,(25) where there is confidence that lower levels of trainers are going to be successful in conducting training sessions (and this can be assisted by maintaining a simple structure for participative activities), and an effective quality monitoring function can be implemented, this model, or a combination of it with some mobile training team features, is a very effective training structure.

One of the good evaluations of cascade training strategy was reported by Suzuki(24) reflecting an in-service teachers training in Nepal. As Suzuki stated, the cascade strategy, a mechanism delivering training messages from trainers at the central level to trainees at the local level through several layers, is largely used for in-service training, as it can deliver many trained teachers quickly and economically. However, despite of its advantages, it is often criticized for its ineffectiveness, because the message is often distorted through long-distanced one-way process, and it hardly makes change at classroom. As most developing countries can afford only cascade, the reported study was examined if it is indeed ineffective through the case study research on in-service training for multi-grade teaching conducted in Nepal for twenty months. First, the inputs of the training including training materials, facilities and the characteristics of trainers and trainees were studied. Second, the process of three layers of training, training of trainer at regional level, training of trainers at district level and local in-set training for teachers, were observed. Third, the classroom practice of selected trainee-teachers before and after the training was compared to examine the difference. The result was that intended messages were distorted, but some of key concepts were transferred and reached teachers. Then the teachers adopted them in their own perception to solve their own problems at classroom. Although some of practice was not delivered as intended, the core concepts survived in the long journey throughout the layers.

McArthur and Yoosabai(16) explain how individuals learn. It is stated that when people receive new input they filter the information according to their existing schemata of the world. They construct meaning of the input, which matches or doesn’t match their prior expectations; if the meaning matches, the present construct remains unaltered in their schemata (assimilation) but if there is a mismatch, their outlook is revised to incorporate the new information (accommodation). Assimilation is fitting new input into the schemata ‘box’ a person already has in the brain. If the input does not fit into the box, it is then adapted and accepted as something new: accommodation. Accommodation stretches people by enabling them to rearrange these schemata in light of fresh knowledge, thus having to interpret it and make decisions about it. To a trainer, assimilation is an undesired and negative reaction to input because effectively the trainee is not learning something new, or is perhaps misinterpreting the input; the input is conformed to the trainee’s existing or prior beliefs. The trainer wishes the input to be accommodated, whereby the trainee’s existing knowledge is revised – they learn something new and change occurs; this is seen as desirable by the trainers.
McArthur\(^{(10)}\) states that, it is also possible for ‘partial’ accommodation to occur, where there is a diluting of input and it is not fully accommodated as intended. This is not necessarily a negative event but one that can lead to creative and welcome new aspects on a topic. However, from a master trainer’s point of view, dilution or partial accommodation is not desirable, neither is assimilation; the goal in cascade training is to pass on new input which is accommodated fully and used as it was originally intended.

Besides constructivism, other changes that trainers can make in cascading are to better fit cultural or physical constraints (e.g.: time, materials or equipment available). Bell and Gilbert talk about reflection on input causing change, to suit local situations.\(^{(16)}\)

Because of the advantages to planners in terms of cost and use of human and material resources, cascade training programmes will remain a feature of industry and organizations for some time to come. Training a small number of staff seems to remain a common practice, particularly considering time- and cost-effectiveness; however it is difficult not to reach the same conclusion as Herchell et al\(^{(36)}\) that there currently appears to be limited evaluative data to support its use. In the meantime therefore it would seem that all engaged in cascade training programs need to ensure that the training that is being provided meets the needs of recipients at all levels. And as Hayes\(^{(22)}\) highlights, active participation in the desired change at all levels has to underpin successful cascade training.

### 6. HOLISTIC APPROACH FOR COMMUNICABLE DISEASE CONTROL

Immunization is an important strategy for controlling the communicable diseases. There are numerous factors for achieving the immunization targets. Political commitment, financing the programs, logistic supplies, infrastructures like cold-chain, socio-cultural factors and of course the health human resources who will manage and apply the immunization programs are among these factors. No doubt that, each of these factors are important and they should be planned and managed in a balanced manner in order to reach the highest immunization coverage rates. In other words, the success of immunization programs depend on many factors and the training of health workers is not the only factor in achieving the program goals. However, the training of health managers and health care workers are key factors in immunization programs. (See: Figure 2)

Morgan and Deutschmann\(^{(4)}\) expressed this concept in their article about vaccination in Papua New Guinea (PNG) clearly by saying that “linking training to policy and practicalities Rehabilitation of the vaccination program in PNG will be dependent on much more than training alone. Much needed to be in place before training could begin: most rural clinics have received new types of equipment for vaccine storage and injection. Vaccine distribution systems have been reinvented. Policies for when vaccines are given have been updated and a health-worker reference manual developed. Conversely, none of this revamp would be effective without practical, participatory, skills-oriented refresher training of health workers. Although the success of the PNG training program will depend on the use of effective methodology and adequate support, its ultimate success is also dependent on a multitude of external factors, including transport infrastructure and security. These factors must also be addressed if the training program and the rehabilitation of equipment and vaccination systems are to achieve the objective of increased vaccination coverage.”

Regarding the cascade training, Christopher J Morgan\(^{(59)}\) thinks that it is relevant, especially for introduction of new technologies or procedures. But when a new training need has emerged, the cascade training approach should be only about one third of the efforts to inculcate new skills. Other methods, such as competency assessment, regular supervision, regular on the job training, clinical rotations of the personnel (periodic placement) and periodic placement of successful managers for a few months in a less successful centre should make the rest. Munevver Bertan\(^{(60)}\) thinks that within the other methods, stated above, “regular overall evaluation” of the immunization program forms an important portion.
Shefer et al\(^{(3)}\) stated that provider education is a part of several effective multi-component interventions, but, results do not allow us to assess the effects of provider education alone in changing provider attitude or vaccination coverage.

As Mathew points\(^{(61)}\) routine immunization can be improved through judicious application of interventions to increase community participation, involve non-professional health workers, create vaccine demand, use a vaccination reminder/recall system and reduce undesirable side effects.

As Hutchison and Peck\(^{(62)}\) stated in their review report, no single solution will increase the rates for all groups; organizational change strategies offer the most effective methods to increase rates. Establishment of separate clinics devoted to screening and prevention, use of continuous quality improvement processes and techniques, and designation of specific prevention responsibilities to non-physician staff have all been suggested as effective organizational change strategies aimed at increasing immunization rates.

In summary, **training of health staff,**

a. is an integral part of communicable disease control programs and should not be approached separately from that whole (Figure 2);

b. has to be supported by regular supervision, regular refreshing training, regular on the job training, regular clinical rotations and regular evaluations at the implementation phase of the immunization programs (Figure 3).

![Figure 2: The holistic approach to the control of communicable diseases including immunization](image-url)
7. DEBATES OVER THE CASCADE STRATEGY and SOLUTIONS

Lora Shimp\(^6\) points out that cascade training is one method within a much broader learning and information-sharing environment that includes a combination of:

- supportive/formative supervision,
- regular and well-facilitated inter-active review meetings,
- active and open monitoring and feedback mechanisms between different levels,
- DQSA (data quality self-assessment) and capacity building in situational analysis and use of data for local decision making,
- understanding of job descriptions and organizational and management structures,
- peer learning and coaching, etc.

According to Shimp, cascade training requires:

- the facilitators' ability and skills to convey knowledge and experience based on adult learning principles (is s/he an educator, manager or trainer?);
- the trainee's ability to absorb, retain, and practice the information/knowledge provided and then the skills to provide the same level of training and information/knowledge to their trainees; and
- the trainee's ability (as well as the flexibility/quality/security of the system within which they work) to continually apply the information/knowledge and improve or build upon it.
- repetition and refresher/updating

Takako Suzuki has summarized clearly the debate over cascade strategy.\(^{24}\) As Suzuki states, some researchers believe that the failure in cascade model lies with the cascade model itself;\(^{31}\) Others argue that the quality of a cascade model depends on the quality of planning and implementation, rather than on inherent weaknesses of the model itself.\(^{64}\) They suggest the ten conditions to maintain the quality of planning and implementation as follows:
Ten Components of Conditionality

1. To run a successful cascade model, the trainees and their needs are to be well defined.
2. Clear training objectives are to be set.
3. It should be supported by high quality consistent training material.
4. The trainers are to be carefully selected for their competence as trainers and their understanding of the particular knowledge and skills which are to be transferred. Cascade training is only effective if the trainers are fully familiar with the practice and not only the theory, and sufficient time is given to the trainers to acquire new knowledge.
5. The role and function of each actor needs to be defined.
6. Each stage has to provide sufficient time for trainers to prepare, and for trainees to absorb the messages.
7. Each stage should be well structured.
8. Any ambiguity in training objectives and materials has to be removed in order to avoid the risk of personal interpretations.
9. Commitment at the local level is needed.
10. The training process should be supervised to ensure the following of training procedures and the accountability of the trainers.

According to Hayes, a strategy often adopted for introducing major innovations into educational systems is the ‘cascade’ model, in which training is conducted at several levels by trainers drawn from a level above. This has a number of theoretical benefits which make it attractive to planners of change on a large scale. ‘It is cost effective, it does not require long periods out of service, and it uses existing teaching staff as co-trainers.’ However, using trainers drawn from successive tiers of the cascade also has potential disadvantages, the principal one being dilution of the training - less and less is understood the further one goes down the cascade. As it was stated above in this paper, David Hayes states that, “yet, it is often not the cascade training model which is the problem, but the manner in which it is implemented. A prime cause of failure is concentration of expertise at the topmost levels of the cascade, allied to a purely transmissive mode of training at all levels. Active participation in the change at all levels is, then, a sine qua non of successful cascade training.”

Positive instances of cascade training can be found as remedy to aforementioned deficiencies. One such is detailed in an article by Mwirotsi et al discussing the training of head teachers in Kenya. Their explicit intention was to reduce dilution in training and weaknesses in monitoring by employing a strengthened cascade system which led to decentralization of responsibilities and an ability to self-regulate the process. Further, the mode of training was not transmissive but experiential and reflective: At every cascade level, as part of the training process, daily sessions on reflection were included. Trainers were required to consider the relevance of what they learned and to think how best their new found knowledge, skills and competences could be adapted and applied to their own local situation as they listened to and reflected on other views.

Reinterpretation of the training experience rather than unthinking acceptance was thus a key factor, something to be welcomed rather than to be feared. Involvement of a cross-section of stakeholders in the production of training materials was also important. This was to counter a potential weakness identified elsewhere, in a British cascade programme for a new examination, where there were also some doubts about the relevance of the materials, which, if they were not prepared in consultation with the very trainers who were targeted, would lose their impact at an early stage in the cascade system.

For cascade training to be effective it must be supported by:

- detailed trainer’s material
- lesson plans
- training resources
• central monitoring
• the trainers at each level must receive on-going professional development.

For successful results, the solutions lie in better planning of “who” and “what” should be trained; effective methods based on adult learning principles; alternative methods that maximise learner input and locate training as close as possible to the workplace and its problems; appropriate inclusion of the community; and coordination with other health system interventions.(4)

The experience of the Australian government in Papua New Guinea (PNG) is very important. The governments of Australia and Papua New Guinea (PNG) have been investing considerable resources into rehabilitation of PNG’s immunisation programs. Re-training the entire rural workforce in the use of new equipment, policies and procedures was an essential, but extraordinarily difficult, component of this. An Australian aid program in PNG is using a modified cascade approach for the revitalisation of immunisation services across the country. Initially, the plan was to train a few trainers in each of PNG’s 20 provinces, who would then train district-level staff, who would, in turn, then train the health workers — a classic “cascade” system. However, evidence from other health worker in-service training suggested that there would be a rapid decrease in quality and quantity of training and was likely to fail. So, the program was reshaped so that a small national team of immunisation “core trainers” worked to develop district trainers in each province. Subsequent workshops for rural health workers are using a “partnership” model — core trainers conduct training for rural staff, together with the new district trainers, until it is clear that the district trainers are comfortable conducting refresher training on their own.(4)

Getting the right “who” trained in the right “what” is crucial, and good planning, based on good science, is essential. Unfortunately, many training-needs assessments stop at simply asking senior health managers their opinion on what their staff should know. More is required, including careful attention to matching health worker competencies with community health needs, planning training methods that are likely to be effective and sustainable, and planning to evaluate not just the training program itself but its outcomes in terms of the objectives of the health system. In addition, the resources, anxieties and environment of those who will take part should all be considered.(4)

Most developing countries that are short of doctors and nurses have evolved a system of paramedical health workers, such as the famed “barefoot doctors” in China. These workers are expected to extend healthcare into rural or impoverished communities on a foundation of basic training that is often limited. Health development initiatives can and should plan refresher training for not only doctors and nurses in urban centres, but also rural health workers in resource-poor settings. Such practitioners need the content of their training to be appropriate to their resources, and based on good science.(4)

Maine(67) states that training often fails when it targets the wrong people, or teaches the wrong content. Early attempts to reduce maternal mortality concentrated significant effort on short workshops to give traditional birth attendants some basic skills in antenatal assessment and delivery care. These failed to prevent maternal deaths. Not only was it almost always impossible to predict which women would develop life-threatening complications, but, if such a complication did ensue, “basic” delivery skills exercised in a village would be insufficient to save a life.

Morgan and Deutschmann(4) pointed that in-service training activities take time, resources and depend greatly on the quality of the teaching. Where resources have been limited, programs have used a “cascade” approach, where central, core trainers are trained well, once, and are then expected to train others, who then train others and so on. Cascade approaches have often failed, because it proves impossible to guarantee the training quality, which is so essential to success, throughout the levels of training. A shortened cascade, where external trainers implement training in partnership with local trainers whose capacity they have developed, may be a reasonable compromise where widespread, rapid retraining is required.

Robinson et al(68) explained their solutions to the disadvantages of cascade training clearly in their article. They say, “several alternative strategies for health worker learning that link with other
health system action are being introduced to development programs. The most effective are those that maximise learner input to content and method and are located as close as possible to the workplace and its problems. Some examples include short practical learning sessions linked to monthly reporting or “pay-day” visits; “supportive supervision” visits structured and resourced to build health worker capacity through practical help and feedback of information; “mentoring” by senior or expatriate staff or “coaching” by peers. One coaching program in Indonesia sent experienced nurses to provide peer-to-peer support in underperforming health centres. The program was associated with a 39% increase in vaccination coverage rates. The use of information technology for distance learning is beyond the scope of this article, but deserves consideration in situations where local resources are able to sustain it.

For solving the “dilution” problem in cascade training strategy, Gilpin\(^{(21)}\) suggests a way of minimising loss of input through cascading by training ‘experts’ from different geographical regions, to guarantee better availability for trainees/teachers in local areas should questions and problems come up. Ensuring more ‘expert’ trainers in more regions would also allow for closer monitoring at later dates.

Gilpin\(^{(21)}\) also suggests that there needs to be a broad, agreed understanding of basic principles of training throughout the area involved. One way of reaching this standard, could be what Mackenzie\(^{(69)}\) proposes: it is not only the trainees who need continued monitoring but the master trainers also, to ensure consistency in their training. This can also minimise any ambiguity in their materials and objectives.

### 7.1. Alternative Strategies

At this section of the paper, two terms often used in the literature: training strategy and training model are discussed. For example, is “cascade training” a strategy or a model? Is “distance learning” a strategy or a model?

Obviously these two are not alternative to one another. Cascading is a design of training, whereas distance learning is a training model or a technique. Cascading is a policy decision, but distance learning is the answer of how this decision will be realized. However, in the literature, the distinction between these two concepts is not clear and in most of the articles “cascade training” is referred as a training model. The author of this paper accepts that, “cascading” a training strategy and the distance learning a training model. Likewise, face to face training, interactive learning, on the job training, blended training act are also examples of training models. If this is the case, then the alternative of cascading (stepwise training) is training the health workers directly (direct training) by the core trainer(s) without using any mid-trainers. In order words, the health workers (implementers, vaccinators) will either be trained directly by a core training group or by mid-trainers who are trained by the core group. In small regions (or countries) where the size of the population is small, the number of workers to be trained is few, with no economical, transportation and communication problems, direct training strategy may be effective. But, in the large, highly populated and less developed countries the cascade training strategy is worth to apply.

Direct training can be done by several ways such as distance learning, face to face etc. However it is most commonly done in the following ways:

### 7.2. Mobile Training Team Strategy

A common strategy for training is to send teams of trainers to various regions of the country to train the end providers directly. This model requires a core group of central staff to devote time to training, which may keep needed staff away from the headquarters during a key period. However, if funding allows, the authorities can hire trainers solely for this purpose to maintain central office staff at headquarters.\(^{(27)}\)

The mobile team strategy involves one or a teams of trainers visiting different geographic localities and conducting one or a number of training sessions there. Different variations would see the
training team training all staff in the locality or training senior staff only, with these staff in cascade fashion then training their subordinate staff. (25)

The following table indicates some significant advantages and disadvantages of this strategy:

<table>
<thead>
<tr>
<th>MOBILE TEAM TRAINING STRATEGY</th>
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</thead>
<tbody>
<tr>
<td><strong>Advantages:</strong></td>
</tr>
<tr>
<td>1. It uses professional trainers to train all, or at least higher level, staff at local levels.</td>
</tr>
<tr>
<td>2. Use of professional trainers may stimulate learning activity.</td>
</tr>
<tr>
<td>3. Has an in-built quality and effectiveness control through use of small teams of professional staff.</td>
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<tr>
<td>4. It provides presenters skilled in participative, competency development training.</td>
</tr>
<tr>
<td>5. It has low logistics costs, relating almost wholly to transport for the trainers.</td>
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<tr>
<td>6. It requires relatively few central organisational resources - most of the organisational load can be devolved to the local level.</td>
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<tr>
<td>7. It provides a consistent stream of evaluation data which can be used to improve session content and presentation.</td>
</tr>
<tr>
<td>8. It reduces reliance on a highly structured trainer's manual - use of professional trainers can allow flexibility in presentation for local conditions.</td>
</tr>
<tr>
<td>9. Length of training session only has to be sufficient to cover technical issues.</td>
</tr>
<tr>
<td>10. Provides cost effectiveness through minimising transport and shorter training sessions.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Disadvantages:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. It requires availability of professional trainers over a longer period.</td>
</tr>
<tr>
<td>2. It does not build training capacities and may not be a sustainable development path.</td>
</tr>
<tr>
<td>3. Depending on the number of teams that are affordable, it may not be possible to maintain small participative training groups if mobile teams are to cover all staff in the time available.</td>
</tr>
<tr>
<td>4. Logistics problems through unavoidable occurrences such as bad weather may stall the whole training program.</td>
</tr>
<tr>
<td>5. It requires planning of training circuits by a central authority.</td>
</tr>
<tr>
<td>6. Time period required for training may be longer than is realistically available.</td>
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<tr>
<td>7. It does not leave trainers' manuals out amongst staff for future reference.</td>
</tr>
<tr>
<td>8. There is no transfer of training skills to staff at regional and local levels.</td>
</tr>
<tr>
<td>9. It has longer-term professional and accommodation costs for trainers.</td>
</tr>
</tbody>
</table>

The major problem with this model in its pure form is the length of time it may take for mobile training teams to train all service providing staff. Conversely, the employment of sufficient mobile teams to train all staff in a short period may not be possible within available budgets or available professional training resources. (25)
7.3. **Simultaneous Model**

Under this strategy all staff is trained simultaneously, on the one day or days, throughout the area. The following table indicates some significant advantages and disadvantages of this strategy.  

<table>
<thead>
<tr>
<th>SIMULTANEOUS MODEL</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Advantages:</strong></td>
</tr>
<tr>
<td>1. It creates a high profile training event which may stimulate recruitment, and interest in learning.</td>
</tr>
<tr>
<td>2. It can be conducted in a short time period.</td>
</tr>
<tr>
<td>3. It can result in training capacity-building if trainers are specifically trained for this event, rather than professional trainers being solely used</td>
</tr>
<tr>
<td><strong>Disadvantages:</strong></td>
</tr>
<tr>
<td>1. It requires a large number of trainers to be available simultaneously.</td>
</tr>
<tr>
<td>2. There is little chance for evaluation or modification of training sessions.</td>
</tr>
<tr>
<td>3. As all professional training staff is likely to be involved in the event, there will be little capacity for monitoring the quality of training presentations.</td>
</tr>
<tr>
<td>4. It is dependent on complex logistics plans working effectively.</td>
</tr>
<tr>
<td>5. It requires considerable central planning and logistics organisation.</td>
</tr>
<tr>
<td>6. It may require larger training groups to enable all training to be conducted on the one day.</td>
</tr>
<tr>
<td>7. It may require production of a greater volume of materials for training purposes than other methods.</td>
</tr>
<tr>
<td>8. It may stretch the capacities of available professional trainers to train in time all trainers required.</td>
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</table>

7.4. **Alternative “Training Team” Models**

Proper and Felling\(^{(70)}\) states that in training the health staff, the training team is a crucial factor. They proposed five different approaches (strategies, models) for designing the training teams for training of family planning logistics namely a) Trickle-down training model; b) Central training team model; c) Regional training team model; d) Training institution model; e) Tiered training team model.

**Trickle-down training model**: In this model, central level staff who have received training in technical content, and possibly training methodology, train the next level of worker, who then train the next level of worker in what they have learned, and so on until everyone who is targeted for training is trained. Expert assistance in the technical area and training is usually limited to training the central level. Curricula are rarely adapted for the various cadre of workers, and at best, a standard curriculum is used throughout. The main advantage of the trickle-down training model is that it does not require an outlay of significant resources (human, material, and financial) that are often scarce in many developing countries.
## TRICKLE-DOWN TRAINING MODEL

### Advantages:
1. The program does not have to hire and support a separate team of trainers to do logistics training. It uses existing staff as trainers.
2. Costs are generally lower and decentralized as the training is conducted by existing staff, takes place near or in the trainer and participant work sites, and usually does not involve extensive needs assessment or curriculum development.
3. If successfully supported by management, the process empowers workers at all levels to plan and conduct training, expanding their own worth.

### Disadvantages:
1. Training is conducted by personnel who are not trained trainers and who themselves are new to the technical content of the training.
2. Training is usually an added responsibility for those who are expected to train the next cadre of personnel. Therefore there is little incentive to schedule training as it means additional work. Training is usually done when there is time, not on a specific schedule. Potentially it could be a very long time before everyone is trained.
3. Little attention is usually given to developing curricula appropriate for each level of personnel. There is inconsistency and dilution of the technical information and skills the further from the central level the training takes place.
4. Personnel need support from the center and resources to do training, both scarce.
5. Since training is an added responsibility given to already fully employed personnel, conducting training may significantly divert them from their usual jobs. Important services that personnel routinely provide may be neglected.

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## CENTRAL TRAINING MODEL

### Advantages
1. Training activities are more likely to receive the support and resources that are needed from central program management.
2. While the skills of the training team may vary at the onset, providing training to the training team to improve those skills is facilitated by the limited number of members. The team's knowledge and skills generally improve over time as they have the opportunity to provide the specific training over and over again.
3. Generally there is more consistency in the knowledge and skills trained by the team and in the quality of the training.
4. As there is only one training team, changes to the curricula or training program are more easily communicated and implemented.

### Disadvantages
1. Because there are a limited number of trainers providing training, it takes longer to train all personnel that need to be trained.
2. This strategy is generally fairly expensive due to the cost of employing additional staff to form the team and of transporting the team throughout the country.

3. As with all work teams, problems may arise should a trainer leave the team, or team members change their status as other programmatic needs arise. Considerable effort is usually given to developing and maintaining the team, and it may be difficult to introduce new trainers after a training program is initiated.

Regional Training Teams Model: In this model, a training team is developed in each region in a country. Team members are either hired specifically for the job or taken from the ranks of regional program staff. Regional training teams are responsible for training all relevant program personnel in their region in the specific field. Curricula usually are developed centrally and adapted for use in each region by the regional training teams, with support from the central level. Central and regional level personnel usually receive training from consultant trainers in the field.

**REGIONAL TRAINING TEAMS MODEL**

**Advantages:**

1. Regional training teams are generally located close to where they will be providing training, thus reducing costs associated with transporting trainers or participants, and conducting training needs assessments. They are also more familiar with the work and situation of program staff to be trained.

2. Because there is one team usually assigned to each region, training can be conducted in many areas at once reducing the amount of time required to complete training nationwide.

3. Regional trainers often have supervisory responsibilities. They are more likely to do supervision and post-training follow-up.

**Disadvantages:**

1. In order for regional training teams to be effective, they require support from central level program management for resources and authority to carry out the training. This may not be easily received when the teams are not actively pursuing it; "out of sight, out of mind." Central level management must be interested and active in the regional training activity.

2. Regional trainers conduct fewer training events than central level trainers and therefore do not necessarily develop the same level of training and technical expertise.

3. If changes are made to the curricula or in the training program design, it is more difficult to communicate with the different regional training teams and institute these changes uniformly.

4. As with a central training team, considerable effort is given to developing and maintaining the team, making the addition of new trainers problematic.

5. In most cases, regional trainers are not just trainers, but have a variety of responsibilities, including training responsibilities in a variety of fields. They may not be able to give each of their responsibilities the attention they need.

Training Institution Model: When training of program personnel is conducted by an organization or institution that is not under the direct management of the program, but is contracted separately, this is the Training Institution Model. The institution may be private, parasternal, or governmental. This model is used when the program itself does not have sufficient management and training personnel in-house to provide the needed training.
conduct of the training program is the responsibility of the training institution, management staff of the technical program is still expected to provide some input into the training activity. This input should include approval of the curricula to be used, the timing of the training, and participants for each training workshop. Consultant trainers assist in the selection of the institution and in building its capacity to provide a specific technical training such as logistics management.

TRAINING INSTITUTION MODEL

Advantages:
1. The program does not have to either have or hire trainers to undertake the training. It does not have to divert existing trainers or staff from current responsibilities to do the specific technical training.
2. Responsibility for developing and conducting the training rests with the institution and therefore the program does not have to divert its own human resources to handle the day to day details of the training activity.
3. Training may be completed in a timelier manner as the institution is expected to undertake the training as a priority activity.

Disadvantages:
1. It is generally more expensive to hire an outside institution, with its own organizational costs. In cases where we have used this model, a donor organization has financed the activity.
2. Unless program management takes specific interest in the work of the institution, it may lose control over the quality and timeliness of the training being provided.
3. Institutionalization of the specific technical training capacity occurs in an organization that is not an integral part of the program. Should that organization determine that it is not lucrative to continue providing the technical training beyond the current contract, the investment of building that capability is lost.

Tiered Training Team Model: The tiered training team model is characterized by having a team of trained technical trainers at each administrative level in the system. The training teams already exist at each level and only require technical training before undertaking a training project. A detailed curricula is developed for each administrative level by the central level in an effort to assure that the various training teams are providing the same technical information and skills. Regional level trainers train provincial level which in turn trains district level trainers.

TIERED TRAINING TEAM MODEL

Advantages:
1. Trained trainers are available to provide the training; therefore others do not need to be diverted from their current responsibilities. Resources are not required to develop training teams.
2. Training may proceed at a more rapid pace as each administrative level has a training team per administrative unit.

Disadvantages:
1. Training may proceed so rapidly that no time is given to evaluation and fine tuning of the training.
2. The model depends on having trained trainers. While in many countries there are existing teams of trainers throughout a program, the quality of their training skills, experience in adapting curricula, and ability to manage training activities may vary greatly.
Johns Hopkins Program for International Education in Gynaecology and Obstetrics (JHPIEGO) named the training of “master trainers” as “advanced training”. According to JPHIEGO, an advanced trainer is a trainer who is qualified in a certain area and can transfer skills to healthcare providers in the area(s) of his/her specialty; attended “advanced training skills courses” (ATS); conduct speciality courses for the related issue; and coach candidate clinical trainers and candidate advanced trainers as they complete their practicum. The advanced trainer also should be knowledgeable and experienced in conducting various types of training courses in the related topic. Training of master trainers is a sensitive and long process. The JPHIEGO defines the development pathway of master trainers as below.

Figure 4:

*CTS refers Clinical Training Skills
7.5. **Appropriate Cascading**

It is the decision of the governments to decide whether to implement the trainings by using either direct or cascading approach. There is an agreement in the literature that generally, the governments and vaccination program authorities prefer the cascade training strategy and their performance is relatively good. **Cascade training strategy is not an inappropriate choice, but the problems are initiated from inappropriate planning and implementation of it.** Therefore, as many of the experts in the training field agree, in order to have better trained health staff with high performance, rather than thinking of an alternative training strategy, the governments (and local and international organizations) have to consider alternative ways of increasing the quality of classical cascade training strategy.

Renu Paruthi, training focal person of WHO in India, who has over 20 years of experience on cascade training strategy mainly in the field of immunization, Steven Stewart, CDC communication expert and Barbara Stilwell from Intra Health International and also Roberto Balsamo of WHO-Globa learning and Performance Management, believe that the difficulties of this strategy can be eliminated by appropriate implementation of it. Paruthi underlines the importance of developing standardised guidelines, manuals and training kits to improve the quality of training. In this respect, in India, the WHO-NPSP and NIHFW have prepared “**Immunization Handbook for Health Workers**” and “**Facilitators Guide Immunization Handbook for Health Workers**” and thus succeed in raising the performances of health workers in the immunization program. Paruthi and Stewart also express two important factors for the success and to raise the quality of cascade training and immunization programs: 1) simple, clearly written and understandable teaching material; 2) monitoring and supervision of the workers, especially in the low performing areas. Balsamo points to the importance of developing formal or informal mechanisms for supporting the new trainers.

Once the strategy is decided, then the next step is to decide how and what techniques it should be realized with. Among these techniques are face to face teaching, distance learning, on the job learning, peers education, coaching and mentoring etc. These techniques may be used alone or in a blended (mixed) manner.

7.6. **Blended Model (Blended Delivery):**

There are several recognized definitions for blended delivery:

1. Dziuban et al: The term “blended learning” refers to courses that combine face-to-face classroom instruction with online learning and reduced classroom contact hours (reduced seat time). The latter point is an important distinction because it is certainly possible to enhance regular face-to-face courses with online resources without displacing classroom contact hours.

2. University of Calgary Teaching and Learning Centre: Blended learning is the integration of face-to-face and online learning to help you enhance the classroom experience and extend learning through innovative use of information and communications technology. Blended strategies enhance student engagement and learning through online activities to the course curriculum and improve effectiveness and efficiencies by reducing lecture time.

3. Garrison and Vaughan, authors of *Blended Learning in Higher Education*, state that: Most importantly, blended learning is a fundamental redesign that transforms the structure of, and approach to, teaching and learning. The key assumptions of a blended learning design are:

   - Thoughtful integration of face-to-face and technology mediated learning
   - Fundamentally rethinking the course design to optimize student engagement
   - Restructuring and replacing traditional class contact hours.

Blended model refers to a mixing of different learning environments. It combines traditional face-to-face classroom methods with computer-mediated activities. According to its proponents, the strategy creates a more integrated approach for both instructors and learners. Formerly, technology-
based materials played a supporting role to face-to-face instruction. Through a blended learning approach, technology will be more important. For example, consider a traditional class meeting schedule. Say that the course would normally meet Monday-Wednesday-Friday, from 1-3 pm. If the institution were to apply a blended learning approach, the course may change so that it meets once per week instead of the usual three-session format. Learning activities that otherwise would have taken place during classroom time can be moved online. There are many different approaches to blended learning. It can take on many shapes or forms, depending on the teachers and learners involved. As of now, there is no consensus on a single agreed-upon definition for blended learning. The terms “blended,” “hybrid,” “mixed-mode”, “multi-method learning” “integrative learning”, are used interchangeably in current research literature. Blended learning is not a new concept, but may be a new term to many users.

A blended learning approach can combine face-to-face facilitation with computer-mediated instruction and/or discovery learning opportunities. It also applies science or information technologies (IT) activities with the assistance of educational technologies using computer, cellular or smart phones, satellite television channels, videoconferencing and other emerging electronic media. Learners and teachers work together to improve the quality of learning and teaching, the ultimate aim of blended learning being to provide realistic practical opportunities for learners and teachers to make learning independent, useful, sustainable and ever growing.

Blended learning increases the options for greater quality and quantity of human interaction in a learning environment. Blended learning offers learners the opportunity “to be both together and apart”. A community of learners can interact at anytime and anywhere because of the benefits that computer-mediated educational tools provide. Blended learning provides a ‘good’ mix of technologies and interactions, resulting in a socially supported, constructive, learning experience; this is especially significant given the profound effect that it could have on distance learning.

In the implementation of a blended model, the facilitator can combine two or more methods of teaching. A typical example of blended learning methodology would be an integrated combination of technology-based materials and face-to-face sessions to present content. An instructor can begin a course with a well-structured introductory lesson in the classroom, and then proceed with follow-up materials online. Blended learning can also be applied to the integration of e-learning with a Learning Management System using computers in a physical classroom, along with face-to-face instruction. For example, in a project in Korea, face-to-face learning and e-learning techniques were combined in the undergraduate teaching of nursing successfully. In Italy, traditional learning was combined with web-based learning and scenario techniques for teaching school health in the area of skin and sexual health in a project named as PAEDIMED. In China, for several years, the China American Psychoanalytic Alliance has provided treatment, training and supervision to Chinese mental health professionals over the internet.

It is also important to point out what blended delivery is not. According to the University of Manitoba, blended delivery is not:

- A conventional face-to-face lecture based class, where the power point slides used for the lectures or course notes are put online;
- A conventional face to face lecture or seminar based course in which online discussions are enabled as an option for students. The discussions are not assessed nor do they replace any face to face activity;
- A conventional face to face lecture based class, where all assignments (e.g. papers) and tests (e.g. multiple auto-marked quizzes or exams) are completed and submitted online;
- An online course with no face to face component;
- A conventional face to face lecture/seminar course in which students are required to do internet research for an assignment;
- A fully online course with scheduled technology mediated synchronous communication;
- A course is offered completely online but the final exam is face to face at a specific location at a specific time.
At the University Of Central Florida (UCF), a continuum of instructional models ranging from fully face-to-face to fully online is adopted. Between the two are web-enhanced courses (face-to-face courses that make pedagogically significant use of the web through a course management system but do not reduce seat time) and blended courses that combine face-to-face and online instruction with reduced seat time.\(^{(76)}\)

There are no specific rules to prescribe what the ideal blend might be. The term “blended” encompasses a broad continuum, and can include any integration of teaching techniques.\(^{(87)}\) In other words, blended learning is a tailor model of combining several learning techniques according to the preference of the training planners and the facilitators depending on the topic and the facilities available.

There are a number of documented and well understood reasons for implementing a blended delivery model for adult learners.\(^{(75)}\) Postsecondary institutions seek to increase student success and retention, provide greater access to students, address funding challenges and provide learning opportunities which meet the needs of the diverse learners. The University of Manitoba states that there are three generally agreed upon reasons for designing blended courses:

1. Improve learning outcomes (e.g. through alternate pedagogical approaches)
2. Increase access (space and time dependence)
3. Reduce costs\(^{(77)}\)

Faculty interest, administrative concerns regarding costs and increasing student access and adult students seeking flexible, convenient learning opportunities which fit into their complex daily lives all drive the growth in blended delivery.\(^{(75)}\) More simply put, optimizing student learning and maximizing physical resources are seen as the main reasons to provide blended delivery instruction.\(^{(75)}\)

### 8. DISCUSSION and CONCLUSION

One alternative of avoiding the disadvantages of cascade training strategy can be the blended training model. However, blended training model, in general, is used for mixing two or more teaching techniques in a course. But, what should be done for training of health workers on immunization should not only be mixing the teaching techniques and using more teaching channels in a course, but rather using a holistic approach which covers all training levels and all immunization program stages. We should think of a comprehensive approach which should fit to the economic, social, cultural, geographic and infrastructural conditions of the region. Additionally the approach should cover the whole program including the implementation phase and reach to the most peripheral operational level of the program.

As stated earlier in this report, in order to succeed in the immunization programs, training has to be supported by regular supervision, regular on the job training, regular clinical rotations, and regular evaluations etc. at the implementation phase of the programs (Figure 3). In other words, the classical training phase has to be continued (continuous training) and supported by a well-functioning implementation phase. The author recommends to call this holistic approach (continuing cascade training approach with better implementation) as “cascade-plus training approach” (see Figure 3). Cascade-plus approach starts from the very beginning stage of planning the training and covers the training and implementation stages. Therefore, in this approach, some additional activities or techniques to the classical cascade training should be considered. Of these actions some should be considered during the planning phase of the training, some during the training levels and the rest at the implementation phase (post-training phase). “cascade plus training approach” for immunization programs can be defined as “a well-planned and implemented cascade training strategy with an understanding of holistic approach to the communicable disease control and immunization programs, practice oriented, flexible, done by multiple-training-techniques, supported with effective supervisions, monitoring, process evaluation .” The articles which stated the success of cascading strategy, in fact, are the good examples of such approach.
8.1. Issues to be considered at the planning phase

Learning needs and training location should be considered and linked to the training. Poor training is a waste of resources. Training of staff is a complex process for which careful planning is essential to bring together the varied information inputs into a cohesive system to allow effective, reliable training delivery at the grass-roots level. Quality of planning for training is enhanced if it is undertaken at both strategic and operational levels.

Involvement of health authorities in the training process at all levels is crucial. Effective training requires a politically supportive environment, a strategy, resources, appropriate guidelines and policies, job expectations, and motivation and feedback.

At the strategic planning stage of training following points need to be identified:

- training objectives, target groups for training, and required learning outcomes
- appropriate mixes of methodologies for target groups and regions
- materials development requirements (In developing training materials, care must be taken to allow sufficient flexibility to handle any changes to legal or operational frameworks that may occur before the implementation starts.)
- overall training resource requirements
- detailed resource needs for training
- the personal responsibilities and accountabilities for training management and delivery
- training evaluation systems

The above requirements may be prepared and implemented centrally, or if cascade training approach is used, there is an opportunity to devolve much of the planning to regional or local levels. Operational training plans would usually detail both the procedural training requirements for staff, and any training of trainers that has to be implemented. Issues that need to be defined in the operational training plans include:

- the numbers of staff to be trained, categorised into any separate target groups determined under the strategic plan
- the methodology by which each of these target groups is to be trained
- the scheduling of training
- production and distribution of materials required for training
- the trainers to be assigned to each training session, including any arrangements for contracting training functions
- the locations to be used for training, their reservation, and the numbers of staff to be trained at each location
- the transportation, accommodations, and communications required to support trainers logistics for distribution of training materials and equipment;
- the methods and resources required for knowledge assessment
- the methods, scheduling, and resources needed for monitoring and evaluating training consistency and quality
- contingency plans for emergency or remedial retraining;
- funds for training.
- methods for process evaluation
The optimum number of trainees in a group differs according to who will be trained, what will they be trained and where the training will take place. However, it is well known that the size of the group affects the quality of the training. So, in order to make the course more interactive, participatory and practice oriented, the optimum number of trainees for a group for training on immunization may be around 5-12.

Angela Kydd\(^{45}\) suggest to minimize the number of trainees in a course session and thus to raise the quality of the course. She believes, in crowded classes, the trainees may not be able to learn teaching techniques and critical technical points enough to carry out their future teaching responsibilities. Kydd underlines the importance of the qualifications of trainers in the second and following levels of cascading and also points that the trainees (future trainers) should be authorized to become trainers after serious evaluations and those who are not yet trained good enough to overcome their future task should not be certified as trainers. She strongly believes that that the quality of training at the first level and the high qualifications of the trainers at the following levels will solve the dilution problem. Kydd, thinks that two level cascade training is the best; those which have more than two levels may increase the dilution problem.

Angela Kydd\(^{45}\) states that there is a high turnover of trained expert trainers. In order to control this problem, she proposes: 1) to ensure the experts design an excellent training package for trainers. This would include all resources used to teach. This means that their expertise is utilised fully before they move on; 2) to design an excellent trainees package. The learning resource has to be comprehensive. Good to add reflective pieces in which trainees can go back and read to see how far they have developed. If the materials are excellent, this is a wonderful foundation and keeps a standard to the training without stifling the creativity of each teacher.

Kydd also suggests that there is encouragement (an award, certificate) for those who elect to be trainers. This way people are encouraged to come forward and avoid recruiting unwilling people to be trainers. It might be useful to build in a ‘part 2’ to the trainee’s learning pack to give them tasks on small aspects of peer and junior training which may build confidence to take on the role as a trainer for the programme. A simple feedback form should be included with the training materials. This can later be used by those responsible for updating materials in order to justify amends/changes.

In developing both the overall strategy and the detailed session plans for training from the defined objectives, it is essential to select a structure and methodology that will be most effective for the training environment, considering factors such as ;\(^{25}\)

- cultural environment;
- available training resources;
- available timeframes;
- affordability;
- Cost-effectiveness.

The knowledge on the topic is not just enough; the focus of training for immunization should be on achieving task competency, the ability to carry out a range of activities accurately and with integrity under pressure. Appropriate methodologies should derive from this basic principle.

Some authors believe that task-based learning is better accomplished in face-to-face training sessions rather than from book study. In remote areas, or where face-to-face training is not affordable for all staff, all local managers at least be provided with the standard reference materials, with a requirement that self-trained managers undertake some form of knowledge assessment, through use of workbooks or exercises provided with the reference materials.\(^{25}\) In addition to these formal training and briefing methods, the importance of informal training activities as a reinforcement should not be underestimated. These could include contact through newsletters or quasi-social activities.\(^{25}\)
A comprehensive trainer training program covers the following issues:

- an understanding the human learning and skills acquisition processes;
- creating a positive learning environment;
- encouraging learner participation;
- the development of a skills/competency training approach as distinct from an education approach;
- directing trainees towards competency objectives;
- setting up an effective training environment such as venue,
- breaks, recognising attention spans, consultation with trainees;
- equitable treatment of each individual trainee;
- time management to achieve training session timetable objectives;
- effective frame working, revision and summarising of information provided;
- imparting values, quality expectations and procedural information;
- directing question and answer sessions and group exercises towards group learning and practical skill demonstration;
- equitable and practical methods of assessing each trainee's competency in performing the required tasks;
- Self-evaluation of the trainer's performance.

Setting up an appropriate training environment is another issue that should be considered at the planning phase. The physical environment in which training is conducted can have a significant impact on the effectiveness of the training. Skills acquisition may be adversely affected by environments in which either those being trained or the trainers themselves feel uncomfortable, or the facilities are inadequate for the requirements of the training session.

When gathering participants a designated training location, attention must be paid to all travel arrangements have been efficiently planned, adequate shelter is provided to participants and refreshments is available for participants during the training period. Responsiveness to training will be significantly diminished if basic living needs have not been satisfactorily organised.

The training facilities and materials are also essential for a successful training. Facilities and materials available at the training venue fall into two groups--the essential, without which training cannot proceed, and the optional, which may improve training presentation. The training materials should be simple especially for on the job trainings. More complex materials may be relevant in clinical practice trainings. Essential materials and facilities would include:

- training manuals and training aids;
- materials for group exercises and revision assignments;
- sufficient materials, forms, and equipment for participative use during the training session;
- spare staff procedures manuals and workbooks (or manuals for all staff attending, if these have not been distributed earlier);
- writing materials, including large sheets of paper for presentation of any group exercises;
- equipment on which training aids depend, such as overhead projectors, video recorders, television monitors, audio equipment, and the like.
- name tags for all participants;
- access to food and drink, especially for longer sessions.

All equipment to be used during the training session should be thoroughly checked by the trainer before the commencement of the session to ensure that all functional (and that the trainer knows how to operate it).^{25}

Barbara Stilwell^{72} complains of high turnover rates of trained personnel. As she has experienced, a quite number of trained staff (trainers) chance their working areas so the lower levels of cascade training loose trained people. This fact also causes of losing money, time and efforts. Therefore, the health authorities should be keen in selecting the candidates to become trainers and should develop policies for keeping them in the sector.

The planning of how to evaluate the training is also crucial. As it is stated in a WHO publication^{2} “evaluation of the impact of training often seems second priority – of far less importance than training design and implementation. Evaluation not only contributes to the quality of the training project but also demonstrates the accountability of training management, the success of the programme and improved performance for the organization. An evaluation plan that is part of the training project from the beginning allows for a more accurate definition of the training needs, goals and specific objectives. The results of the evaluation allow the organizers to improve the training: an evaluation provides evidence for continuing with the training as is, or for improving it where necessary. At the same time it gives the training team and management the confidence to continue with the work. To “evaluate” training means finding out what the “value” of training really is – to the trainees, their managers, their colleagues, the organization for which they work, and for the wider community. Thus it is important to define clearly the training objectives so that the results of the training can be measured against them.”

### 8.2. How to train / selecting the learning techniques

Selection of training techniques is a huge issue which can be the topic of another report. Besides the classical face to face training technique, other techniques should be considered as well. These techniques may be applied independently or in an integrated manner (blended training) with face to face training or with any other technique.

According to Morgan and Deutschmann^{4} several alternative strategies for health worker learning that link with other health system action are being introduced to development programs. The most effective are those that maximise learner input to content and method and area located as close as possible to the workplace and its problems. Some examples include short practical learning sessions linked to monthly reporting or “pay-day” visits; “supportive supervision” visits structured and resourced to build health worker capacity through practical help and feedback of information; “mentoring” by senior or expatriate staff or “coaching” by peers. One coaching program in Indonesia sent experienced nurses to provide peer-to-peer support in underperforming health centres. The program was associated with a 39% increase in vaccination coverage rates.^{68}

The adults learning science “andragogy” is based on the following assumptions;^{88}

1. Adult learners bring life experiences to the learning process that should be acknowledged;
2. Adults need to know why they need to learn something, and how it is relevant to their lives;
3. Experiential, hands-on learning is effective with adult learners;
4. Adults approach learning as problem-solving;
5. Adults learn best with the topic is of immediate value to them in their lives.

According to these authors Jones and Walters^{89} and Lambert^{90} the essentials of adult training are below:

- Adults strive to be self-directed;
- Adults enjoy planning and contributing their own learning experiences;
- Adults bring extensive experience to the learning situation;
• They always look for ways in which they may transfer their previous learning to the new situation; this increases their sense of self-worth and confidence;
• Adults’ readiness to learn is oriented to the tasks they perceive inherent in their social and professional roles;
• Their focus is more performance centred than subject centred.

Adults learn best when their own motivation is supported, their active participation (interactive and participatory learning) is encouraged, their experience is valued and the content is relevant to their daily work. As Benjamin Franklin said, “Tell me and I forget, teach me and I may remember, involve me and I learn.”

Thus, the focus in programs must shift from the trainer’s teaching to the participant’s learning. David Werner’s ground-breaking work encapsulated this in its title, Helping health workers Learn, and has been extended by others into concepts such as the “transfer of learning.”

Transfer of learning is also known as “peer assisted learning” (PAL). A peer is a student (or an equivalent of the trainee) at the same or different academic or experience level. Learning can be defined as "to gain knowledge, understanding, or skill through instruction or experience." Therefore, PAL is the act or process of gaining knowledge, understanding, or skill from students that are either at different or equivalent academic or experiential levels.

Training by peers has been proposed as an efficient, effective, and sustainable training strategy. Many studies have shown that peer-based programmes can deal effectively with social and psychological problems, and that peers can function as counsellors, trainers, mediators between professionals and clients, or leaders of self-help groups. For example, a meta-analysis of 240 evaluations of substance abuse prevention programmes found that programmes using peer-based strategies were consistently more effective than programmes using other approaches.

There are other publications which state the opposite. A systematic review and meta-analysis of peer education interventions in developing countries made by Medley et al on HIV prevention showed that peer education programs had a non-significant effect on sexually transmitted infections. Meta-analysis indicates that peer education programs in developing countries are moderately effective at improving behavioural outcomes but show no significant impact on biological outcomes.

Peer assisted learning (PAL) has not only been demonstrated to reduce demands on clinical instructors, but also to improve the overall clinical experiences for students. PAL should not replace the roles of the clinical instructor regarding assessment, teaching, mentoring, and leadership. Rather, PAL should be used to supplement and augment the clinical instructor. Students involved in PAL should derive mutual benefits whether the student is the teacher or the learner. Henning et al in their literature review on PAL concluded that appropriate use of PAL can be implemented.

Peer assisted learning may be an option for strengthening the effectiveness of training for immunization programs. The peers may be the supervising health staff who train less experienced vaccination providers, or the local people (peasants) who are trained as peers and then let to train their neighbours (lay workers) for assessing the health services.

The effectiveness of the second approach has been shown by Gözüm et al in Turkey where they have educated 40 women on breast cancer screening as peer educators and expected each of them to educate 200 women.

One important point regarding peer assisted education is the evaluation of the training. Machado et al conducted a study for comparing self-assessment, peers assessment and tutor assessment to calculate the final educational process grade for each tutorial. They concluded that peers’ evaluation may not be accurate and the study has stimulated reconsideration as to avoid the use of numerical scores for peer and self-assessment as part of the overall student grade during the course.

The competency-based training approach helps to ensure that learning generates new knowledge and skills that relate to real workplace needs. A well-constructed, practical,
participatory workshop can be an empowering means of introducing new ideas, such as having an essential drugs list, or practical skills, such as immunization program tasks. Strategies that emphasise learning by doing and problem-solving are particularly useful in building competencies needed by health workers in resource-poor settings.\(^{110}\)

On the job training can be done through peers. One of the studies which showed that on the job peer training is effective in improving the coverage rate of immunization was done in Indonesia.\(^{111}\) In Indonesia responsibility for immunizations is placed on local government health centres and on the nurses who provide the immunizations at each centre. An on-the-job peer training programme for these nurses, which was designed to improve the immunization performance of poorly performing health centres in terms of coverage and practice in Maluku province, was evaluated. Experienced immunization nurses were sent to health centres where nurses were inexperienced or performing poorly; the experienced nurses spent 1–2 weeks providing on-the-job training for the less experienced ones. An evaluation of the 13 centres that participated in the programme and the 95% did not found that the programme increased both immunization coverage and the quality of practice. Coverage of diphtheria/pertussis/tetanus (DPT), polio, and measles vaccinations rose by about 39% in all 13 participating centres when compared with non-participating centres, and by about 54% in the 11 centres that had a functioning transportation system during the year after training. These results reflect increases in the actual number of doses given and improvements in the accuracy of reports. Potential threats to the study’s validity were examined and found not to be significant. The out-of-pocket cost of the training programme was about US$ 53 per trainee or about US$ 0.05 per additional vaccine reported to have been given. The marginal cost per additional fully immunized child was estimated to be US$ 0.50.

There are several reports\(^{112,113,114,115}\) which state the effectiveness of using entertainments like scenarios and dramas in education. Theatre, role plays, song and storytelling can entertain and inform at the same time. They give a personal dimension to a subject and help people to think and talk about sensitive issues more easily.\(^{113}\) Yet stories typically place the learner in the role of passive audience instead of active learner. It is better to design the drama technique in an interactive way. The interactive drama is to exploit the edifying power of story while promoting active learning. It immerses the learner in an engaging, evocative story where he/she interacts openly with realistic characters. The learner makes decisions or takes actions on behalf of a character in the story, and sees the consequences of her decisions. The learner identifies with and assumes responsibility for the characters in the story, while the control afforded to the learner enhances intrinsic motivation.\(^{116}\)

Many scholars have emphasized the necessity of changing or complementing face-to-face methods for continuing education.\(^{117}\) New advances in information technology provide improved opportunities for continuing education for health personnel particularly via the web.\(^{118}\) Teaching through the web can overcome some of the limitations of face-to face teaching methods and provides easy and adaptable access to learning.\(^{119}\) A web-based method can be used as an alternate mode of teaching and learning and as a substantial supplement to traditional teaching methods.\(^{118}\) By using the web, different learning styles can be taken into consideration, distance learning becomes possible, more time is saved, and information and skills can be shared.\(^{118,120}\) Studies, especially for nurses’ education’ experiences of web-based learning have shown increased learner satisfaction, activeness in learning, ease of access, as well as a desire to use technology for learning.\(^{119,121}\) On the other hand, in their quasi-experimental study, Khatory et al\(^{122}\) concluded there was no significant difference between the groups in either the pre-test nor the post-test scores in the knowledge test. However, there was a significant difference in the pre-test and post-test scores within each group. Based on these findings, they say that the web-based method seems to be as effective as the face-to-face method in the continuing education of nurses. Therefore, the web-based method is recommended, as complementary (blended) to the face-to-face method, for designing and delivering some topics of continuing education programs for nurses.

Mehrdad et al\(^{123}\) reached to similar results in teaching nurses and midwives in Iran. In their article they stated that there were no significant difference between student’s exam scores in both lecture and e-learning methods. However they found that students reported better capability and
independency in e-learning method while lecture was obtained higher scores in “effectiveness on learning” and “motivation” characteristics. They recommended using e-learning method with appropriate interactive strategies and attractive virtual environments to motivate students.

Aggarwai et al\(^{(124)}\) did an intervention study in order to determine whether online courses in biostatistics and research ethics could achieve similar improvements in knowledge, as traditional on-site, classroom-based courses. They have concluded that, online and on-site training formats led to marked and similar improvements of knowledge. This combined with logistical and cost advantages of on-line training, may make on-line courses particularly useful for expanding health research capacity in resource-limited settings.

The language is confusing. ‘Distance education’ is sometimes taken to mean the use of television and at others the use of the internet. The words imply that students are always remote and never meet each other or their teachers. ‘Open learning’ suggests that anyone can enrol and start and finish when they like. ‘New information technologies’ sounds good but vague. These guidelines are about the use of a range of technologies in education, using a set of definitions that have general currency. Distance education has been defined as an educational process in which a significant proportion of the teaching is conducted by someone removed in space and/or time from the learner. Open learning, in turn, is an organised educational activity, based on the use of teaching materials, in which constraints on study are minimised in terms either of access, or of time and place, pace, method of study, or any combination of these. The term ‘open and distance learning’ is used as an umbrella term to cover educational approaches of this kind that reach teachers in their schools, provide learning resources for them, or enable them to qualify without attending college in person, or open up new opportunities for keeping up to date no matter where or when they want to study. Open and distance learning often makes use of several different media. Students may learn through print, broadcasts, the internet and through occasional meetings with tutors and with other students.\(^{(125)}\)

Distance education has been used to reach trainees in geographically challenging areas such as the riverine regions in Guyana, mountainous areas in Nepal, the dispersed communities of the Indonesian archipelago and the small island states in the Caribbean and Pacific. In some high population countries such as China and Pakistan, distance programmes have played an essential role in providing teacher education on a huge scale. In many Latin America countries distance education has been used widely to support curriculum reform and teacher upgrading. Teacher education by distance is being used to redress inequalities in teaching qualifications in post-colonial Namibia and Zimbabwe and in South Africa, as a tool for reconstruction of the teaching service in Uganda. In other countries, it is being used to reach marginalised communities such as refugees in Sudan, itinerant communities in Mongolia, and minority-groups in northern Pakistan.\(^{(125)}\)

In the literature, information about the use of distance education in immunization delivery is limited. Lancaster et al in their article,\(^{(126)}\) discussed meeting the challenges encountered in changing a paper-based, interactive immunization delivery curriculum into an online, self-paced format. The program, TIDE (Teaching Immunization Delivery and Evaluation), was developed through collaborative efforts of medical educators and content experts with initial funding from the Centers for Disease Control and Prevention, the Ambulatory Paediatric Association and the Medical University of South Carolina. The authors summarized the efforts of the development team to create interactive case scenarios, provide ready access to resource materials and an audit tool for assessing the immunization rate of the learner's clinic or practice, and meet the rigorous requirements of awarding continuing education credit. Data based on more than 100 doctors' and nurses' evaluations indicate a trend toward higher overall ratings of the online version than the paper version (88% online vs. 76% paper reported module as very good or excellent). As the TIDE program is evaluated, the team's goal is to incorporate instructional methods to increase relevance and learners' opportunities for 'learning by doing.' Future plans include extending online office assessment tools to encourage use for continuous quality improvement, and providing a mechanism for learners to share their techniques for obtaining and maintaining high immunization rates.

Another type of skill based training is to mix the theoretical and practical trainings within a model called “sandwich training”. In this model, the trainee is trained with consecutive trainings of
theoretical and on the job sessions. In other words, the trainee first attends a course, then works in a service unit for a period, and then attends a second course. These consecutive steps may continue as needed. If this model is applied in the case of immunization, the health worker is trained in a course and then sent to his/her health station and practice vaccination program for some time; then he/she is further trained in a second course. This may be followed by a second practice time and then a third course so on. Thus, the health workers may have the chance of implementing what they have learned and then exchange experiences with other trainees and their tutors. This approach may also help refreshing the knowledge and skills of the trainees.

8.3. **Strategies During The Implementation Phase (post training phase):**

As stated earlier sections of this report, the success of immunization programs is not only limited to the training of staff, many other factors should also be considered. Therefore, overseeing the implementation is crucial to control whether the immunization operations are running smoothly or not and find and solve problems, if any, as early as possible. Supervisions also will enable the central or local authorities to update the knowledge of the personnel and re-motivate them. In other words, supervision is not only inspecting the implementers, but also finding and solving the problems, including educating the health worker on how to do his/her job accurately. How to make these supervisory visits effective depends on the local conditions, but in general, possible policies and activities may include the following:

**Coaching and Mentoring:** Christopher Morgan states that ensuring that resources and time is greater, on a per person participant basis, at the time peripheral levels, as compared with central levels. Usually cascade training programs spend less time and money per participant the more peripherally they go and this is what makes them fail.

Coaching and mentoring can solve this problem. Coaching, when referring to getting coached by a professional coach, is a teaching or training process in which an individual gets support while learning to achieve a specific personal or professional result or goal. The individual getting coached may be referred to as the client, the mentee or coachee, or they may be in an intern or apprenticeship relationship with the person coaching them. Coaching may also happen in an informal relationship between one individual who has greater experience and expertise than another and offers advice and guidance, as the other goes through a learning process. The structures, models and methodologies of coaching are numerous, and may be designed to facilitate learning new behaviour for personal growth, or professional advancement. The coaches serve as a source of support and knowledge and assist in problem solving for the coachee. In the case of cascading in immunization programs, the local nurses, midwives or other vaccinators can act as mentors or coaches to their colleagues. This approach can be used in all levels, but especially at the third and following levels of training and in the implementation phases.

**Supportive Supervision and Site Visits:** Continuous monitoring and evaluation activities at each stage of training, but, especially at the implementation stage are important to find out the problems and hindrances so that they can be eliminated with appropriate solutions. This can be done through planned supervisions. Supervision should aim to observe the problem, find out their reasons and solving the problems. The problems can be solved through logistic support, in-service education, eliminating the low performance staff or by taking disciplinary measures. Without solving the problem at the peripheral level one cannot talk about effective supervision. This approach is also called as “supportive supervision”. Supervision can be done by visiting the end point (health units), by other communication ways and evaluation of records and reports sent by the health workers.

Irregular supervisions (site-visits) for evaluating in-service training should also be planned. Among others, a standard check-list can be developed as an evaluation instrument for all in-service trainees.

**Refresher Courses / Crash Training / Travelling Seminars / Conference and Workshop/ Drip Training:** In order to make the training continuous, the authorities should plan how to update the
managers, tutors, health care workers and how to refresh their knowledge and skills. The ways of
doing this may be planning refresher courses with small groups, crash trainings at the periphery,
making travelling seminars (courses on the wheels) which will enable to visit and see positive
examples of implementation and having the chance to contact with successful staff, planning
conferences by the experts and short workshops where the health care workers exchange their
experiences and think of practical solutions for the problems they have faced with interactive
participation.

Christopher Morgan\textsuperscript{(59)} recommends a \textbf{“drip training approach”} for the continuous and
refreshing trainings of the staff. The basic concept of this approach is to send small quanta of
information out in vaccine shipment, perhaps as a single page information sheet suitable for pinning
up on a clinic’s wall. So, it often includes, posters, new guidelines, memos, policy updates,
explanations of a new delegation or authorisation, short practical monthly sessions, pay-day
discussions, monthly report feedback. In this approach, the central or regional trainers (or supervisors)
may visit the staff in their working places for further discussions and on the job training purposes.

\textbf{Provider assessment and feedback:} Provider assessment and feedback involves giving
retrospective information to immunization providers about their performance in delivering one or
more vaccines to a client population. Feedback may or may not involve other interventions such
as benchmarking (that is, comparing performance to a goal or standard) and giving incentives to
providers who perform well. Feedback can result in improvements in vaccination coverage either by
changing provider knowledge, attitudes, and behaviour, or by stimulating changes in the vaccine
delivery system (reminders, standing orders), or some combination.\textsuperscript{(3)}

In a literature review covering 27 studies conducted by Shefer et al\textsuperscript{(3)} it was shown that
provider feedback appears effective in improving vaccination coverage by itself and in combination
with other interventions. Several studies have demonstrated that improvements in coverage can be
maintained or further improved over several years of follow-up. Positive effects of feedback have been
shown in a range of settings (private practice, managed care, public and community health centres, and
academic settings), for a range of providers (resident and staff physicians, non-physician providers,
internal medicine, family medicine, general practice), for both adults and children, and for most
universally recommended antigens (MMR, DTP, OPV, Hib, influenza, pneumococcal, TD).

\section*{9. A PROPOSAL FOR A CASCADE PLUS MODEL}

Hayes\textsuperscript{(22)} concludes, because of their advantages to planners in terms of cost and use of human
and material resources, cascade training programmes will remain a feature of educational systems for
some time to come. This is especially so where attempts at large-scale innovation are being effected in
under-resourced situations. Given this, it behoves all of us engaged in cascade programmes to ensure
that the training provided meets the needs of recipients at all levels. This can only be done if the
criteria identified earlier are met. To reiterate: a) the method of conducting the training must be
experiential and reflective rather than transmissive; b) the training must be open to reinterpretation;
rigid adherence to prescribed ways of working should not be expected; c) expertise must be diffused
through the system as widely as possible, not concentrated at the top; d) a cross-section of
stakeholders must be involved in the preparation of training materials; e) decentralization of
responsibilities within the cascade structure is desirable.

As it was highlighted in this report, there is a consensus among authors that, although, some
disadvantages and ineffective results have been observed, it is very clear that because of the
advantages to planners in terms of cost and use of human and material resources, cascade training
programs will remain a feature of organizations for some time to come. Yet, it is often not the cascade
training model which does not give optimal results, but the manner in which it is implemented. It was
clearly seen that if the cascade training strategy is well planned, carried out by blending appropriate
Teaching techniques such as distance learning, coaching-mentoring, interactive, skill oriented, problem
based and on the job training, supported with audio-visual teaching methods and dramas and is well
monitored/supervised during the implementation phase, it can be an effective strategy for training the health care staff and managers. In other words, the classical cascade training strategy has to be improved and strengthened with additional models so that it will be more effectively used. In order to differ this approach from the traditional cascade training, it is called as “cascade plus training strategy”.

Taking these points into consideration and depending on the arguments stated above, an example of “cascade plus training approach” is proposed in Table 2. As it is seen in the table, this approach covers all stages of training and the operations level. The training models and techniques should be selected or combined depending on the need and feasibility at the local level.

Table 2: Training / Learning techniques by levels of “cascade plus training approach”– Two level cascade training (*) (Z. Oztek)

<table>
<thead>
<tr>
<th>Planning phase (Pre-training phase)</th>
<th>Training of trainers (First level of cascade training)</th>
<th>Training of providers (Second level of cascade training)</th>
<th>Implementation phase (Post training phase)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Select trainees</td>
<td>Blended training</td>
<td>Blended training</td>
<td>Supportive supervision and competency assessment through</td>
</tr>
<tr>
<td>Develop material</td>
<td>• Face to face</td>
<td>• Face to face</td>
<td>• site visits</td>
</tr>
<tr>
<td>Decide method</td>
<td>• Interactive</td>
<td>• Interactive</td>
<td>• telephone calls</td>
</tr>
<tr>
<td>Find resources</td>
<td>• Problem based</td>
<td>• Problem based</td>
<td>• records evaluation</td>
</tr>
<tr>
<td>Organize facilities</td>
<td>• Entertainments/Scenarios / dramas</td>
<td>• Entertainments/Scenarios / dramas etc</td>
<td>Coaching/ mentoring</td>
</tr>
<tr>
<td>Train master trainers (Advanced training)</td>
<td>• Distance / On line</td>
<td>• Distance / On-line</td>
<td>Refreshing training</td>
</tr>
<tr>
<td>• Self-learning</td>
<td>Workshops</td>
<td>Workshops</td>
<td>Travelling seminars</td>
</tr>
<tr>
<td>• Blended learning</td>
<td>Peer learning</td>
<td>Peer learning</td>
<td>Rotations</td>
</tr>
<tr>
<td></td>
<td>Mentoring</td>
<td>Coaching and mentoring</td>
<td>Drip training</td>
</tr>
<tr>
<td></td>
<td>Learning by doing</td>
<td>On the job training</td>
<td>Distance learning</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Refreshing training</td>
<td>Providers’ assessment</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Travelling seminars</td>
<td>and feedback</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rotations</td>
<td>Practice evaluations</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Drip training</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Distance learning</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Providers’ assessment and feedback</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Practice evaluations</td>
<td></td>
</tr>
</tbody>
</table>

(*) Appropriate items will be selected and blended according to local conditions in each level.

In the classical cascade training approach, the usual understanding is to train the health care workers and send them to their vaccination units as implementers. However, training is not the end, but the beginning of a successful immunization program. Unless the impact of the training is not evaluated and vaccine providers (implementers) are not supervised the immunization goals cannot be reached. Therefore, in a better approach, training has to be considered as a whole with pre and post training phases. In other words, including the pre and post training phases into the training program are the “plus” to the classical cascade training.
**Key differences of cascade plus training**

The key differences between the classical and cascade plus training approaches are summarized in the table below:

**Differences between classical cascade and cascade plus training approaches**

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classical Cascade Training</td>
<td>Cascade Plus Training</td>
</tr>
<tr>
<td>Focused on education</td>
<td>Holistic approach /Pre-During-Post training</td>
</tr>
<tr>
<td>Course oriented</td>
<td>Continuous training</td>
</tr>
<tr>
<td>Classroom oriented</td>
<td>Practice oriented</td>
</tr>
<tr>
<td>Inflexible curriculum</td>
<td>Flexible and tailor type designed curriculum</td>
</tr>
<tr>
<td>Oriented to success of training</td>
<td>Oriented to success of immunization program</td>
</tr>
<tr>
<td>Evaluation of training</td>
<td>Evaluation of training and practice</td>
</tr>
<tr>
<td>Dilution and misinterpretation of information at the lower cascade levels</td>
<td>Appropriate information transfer to lower cascade levels</td>
</tr>
<tr>
<td>Limited sectors involved</td>
<td>Multidisciplinary approach</td>
</tr>
<tr>
<td>Top to down training</td>
<td>Providers participation</td>
</tr>
</tbody>
</table>
ANNEX 1

Teleconference

A number of well-known experts were contacted to conduct the phone interview with below e-mail message. As stated earlier of this review, 8 experts responded to the phone interview invitation. The interviews were performed as a structured interview by asking questions mentioned in the e-mail message. Beside questions prepared in advance, the experts were provided with the opportunity to share their experiences on cascade training approach.

E-mail sample:

Dear …..

The World Health Organization (WHO) is willing to raise the quality of in-service trainings of health care workers and managers on immunization programs globally. I am requested by the WHO-HQ to make a literature review about the strategies and models on doing the related trainings with the aim of improving immunization coverage worldwide.

As you know, a good portion of training is done through cascades. However, there has been scepticism on the effectiveness of this mechanism. This scepticism initiated the current study for assessing the impact of training models and search for a better way to train the health care workers. I believe, this literature review and assessment will enable us to make necessary revisions and amendments in the training approaches of health care workers on immunization programs.

In this respect, WHO has given your name as an expert on the topic and wishes to include your ideas and comments in the report. I would like to interview you by phone on the topic to ask you specifically about your evaluation of this method of training.

Please confirm whether you would be available for a phone interview on September ............ at ............. hours your local time, or on September ............. at ............. hours your local time

I thank you in advance,

Looking forward to your response soon,

Regards and best wishes

Prof. Dr. Zafer Öztek

* If you are not available by phone, I would appreciate your response to the following points by e-mail to zoztek@hotmail.com

1. Do you think that cascade training model is relevant for training health care workers on immunization programs. Why?
2. Should WHO intervene a different approach rather than cascade model. If yes, what type of training approach / strategy / model do you recommend?
3. Can cascade training approach be implemented in a better way? If yes, how should it be realized?
4. Please indicate your other comments.
**Phone interview list:**

<table>
<thead>
<tr>
<th>Name</th>
<th>Surname</th>
<th>Interview Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr. Renu</td>
<td>Paruthi</td>
<td>12.09.2012</td>
</tr>
<tr>
<td>Ms. Lora Ann</td>
<td>Shimp</td>
<td>17.09.2012</td>
</tr>
<tr>
<td>Mr. Steven</td>
<td>Stewart</td>
<td>18.09.2012</td>
</tr>
<tr>
<td>Dr. Christopher</td>
<td>Morgan</td>
<td>19.09.2012</td>
</tr>
<tr>
<td>Dr. Angela</td>
<td>Kydd</td>
<td>19.09.2012</td>
</tr>
<tr>
<td>Dr. Barbara</td>
<td>Stilwell</td>
<td>19.09.2012</td>
</tr>
<tr>
<td>Dr. Roberto</td>
<td>Balsamo</td>
<td>21.09.2012</td>
</tr>
</tbody>
</table>
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60. Morgan, Christopher, Personal communication, Principle Fellow, Centre for International Health, Burnet Institute, Melbourne, Australia.
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