

Rehabilitation of people with physical disabilities in developing countries

Program Report for Collaborative Agreement:

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1. Executive Summary

Prosthetics and orthotics services enable people with physical impairments of their limbs or spine the opportunity to achieve greater independence to participate in society. Alarming, such services are not available to an estimated 9 out of 10 people with disabilities globally due to a shortage of personnel, service units and health rehabilitation infrastructures¹. To try and address this situation, our International Society for Prosthetics and Orthotics (ISPO) members have been working towards development of the prosthetics and orthotics sector since our Society's inception in the 1970s. With a particular interest in the improvement of the quality of prosthetics and orthotics care, we have focussed on the promotion of standards of professional training for the clinicians who deliver face to face client care, namely prosthetists/orthotists and orthopaedic technologists. Despite our efforts and significant expansion of ISPO training program recognitions, the development of the sector is too slow in developing countries to meet existing needs or keep pace with the growing populations of people with disabilities.

This United States Agency for International Development (USAID) funded program of activity has accomplished much to support and inform us about the field of prosthetics and orthotics in developing countries. It also offers us new hope and opportunities to develop our sector. We delivered three distinct activities:

1. Scholarship support
2. Measuring the impact of training in prosthetics and orthotics
3. Enhancement of prosthetics and orthotics service provision

Firstly, our successful scholarship program saw 112 candidates complete their scholarships to become prosthetists/orthotists and orthopaedic technologists, reflecting a 95% student progression rate due to rigorous selection criteria and students with a dedication to their studies. These scholarship alumni belonged to 34 different home countries and were all committed to work in prosthetics and orthotics clinical services after graduation. We welcome these new professionals into our field and look to them for fresh ideas and solutions to help meet the need for better services.

Secondly our impact assessment series with field visits to 13 countries produced six impact assessment reports. When analysed all together, four themes of recommendations emerged for sector development:

- Theme 1 = Leadership and Governance
- Theme 2 = Workforce
- Theme 3 = Service Provision
- Theme 4 = Practice and Technology

The impact assessment also generated new information about modes of learning: there were no significant differences in the professional practice of orthopaedic technologist graduates who attend face-to face training compared to blended distance learning training.

We also discovered that ISPO Category I trained personnel took on more senior positions and higher level responsibilities in clinical, teaching and management roles than their ISPO Category II trained colleagues in developing countries. There are not enough ISPO Category I personnel working in less resourced settings.

Thirdly, our work in partnership with the World Health Organization has resulted in progress towards the first WHO Standards for Prosthetics and Orthotics Service Provision. We believe that this is an extremely important piece of work and that the launch of these standards at our World Congress in 2017 will be a catalyst for the development of the prosthetics and orthotics sector. The Standards will be a significant milestone in providing UN member states and other stakeholders with guidance and encouragement to enhance prosthetics and orthotics services in all countries, but will be of special significance in developing countries where poverty and disability are closely associated.

We look forward to building on the body of work derived from the program and improving the quality of life of the people we serve in prosthetics and orthotics services.

2. List of acronyms

Cat I	=	Category I
Cat II	=	Category II
CSPO	=	Cambodian School of Prosthetics and Orthotics
ENAM	=	Ecole Nationale des Auxiliaires Medicaux
ISPO	=	International Society for Prosthetics and Orthotics
LLO	=	Lower Limb Orthotics
LLP	=	Lower Limb Prosthetics
LWVF	=	Leahy War Victims Fund
MI	=	Mobility India
P&O	=	Prosthetics and Orthotics
PIPOS	=	Pakistan Institute of Prosthetics and Orthotics Science
QOL	=	Quality of Life
TATCOT	=	Tanzania Training Centre for Orthopaedic Technologists
TU	=	Tumaini University
UDB	=	University of Don Bosco
UN	=	United Nations
USAID	=	United States Agency for International Development
VIETCOT	=	Vietnamese Training Centre for Orthopaedic Technologists
WHO	=	World Health Organization

3. Acknowledgements

We are grateful to the many people and partner organizations who supported this program by assisting with steering, advising, organising, auditing, researching, promoting, editing and administering activities.

This program was made possible by the generous support of the American people through the United States Agency for International Development. The contents are the responsibility of the International Society for Prosthetics and Orthotics and do not necessarily reflect the views of USAID or the United States Government.

Together we will continue moving beyond physical disability

4. Introduction and background

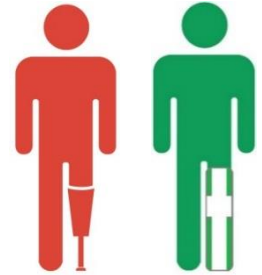
Living with a major limb amputation, absence or physical impairment in the less resourced setting of a developing country is very challenging. Poverty and weak health systems mean that the affected person living in a developing country is more likely to either be sub-optimally treated or not treated at all. This leads to a downward spiral of neglected conditions, ever more complex deformities and increasing levels of disability. Without proper treatment, the person with a disability potentially experiences continued exclusion from society.

4.1. Prosthetics and orthotics in developing countries

The field of prosthetics and orthotics offers rehabilitation solutions to people with physical impairments of their limbs or spine to enable them to fulfil their potential for independence, inclusion and participation in society.

Prostheses and orthoses are assistive health technologies provided as part of rehabilitation services and have the following definitions²:

- *Prosthesis; prosthetic device*: externally applied device used to replace wholly, or in part, an absent or deficient limb segment.
- *Orthosis; orthotic device*: externally applied device used to modify the structural and functional characteristics of the neuromuscular and skeletal systems.



Globally, it is estimated that 100 million people need prosthetic and orthotic services, but only 1 in 10 people who need assistive devices like prostheses and orthoses have access to them, with the unmet need being even higher in developing countries¹. There is, therefore, a tremendous need for development action in these services.

The International Society for Prosthetics and Orthotics is a global multidisciplinary non-governmental organization aiming to improve the quality of life for persons who may benefit from prosthetic, orthotic, mobility and assistive devices. ISPO was funded by USAID to support this collaborative agreement “Rehabilitation of physically disabled people in developing countries”. This program of work represents significant progress in addressing and understanding the need for development of prosthetics and orthotics services and personnel in less resourced settings.

4.2. The prosthetics and orthotics workforce

Personnel involved in the provision of prosthetics and orthotics services include physicians, therapists, prosthetists/orthotists, orthopaedic technologists, technicians, managers, administrators and support staff.

ISPO has well established professional standards³ for the personnel who work as allied health professionals and provide prosthetic and orthotic devices as treatment interventions. This program focuses on clinicians who work face-to-face with clients with a disability. ISPO certifies these professionals as Prosthetist/Orthotist (ISPO Category I) and Orthopaedic Technologist (ISPO Category II) professionals when they graduate from ISPO evaluated courses (see Table 1). Today, ISPO recognises thirty-two training programs as meeting the minimum standards. Further programs are in the recognition process.

ISPO professional standards for clinicians		
Category I Prosthetist/Orthotist (or equivalent term)	Entry requirement: University entry level (or equivalent, 12/13 years schooling)	Training: 3/4 years formal structured leading to University Degree (or equivalent)
Category II Orthopaedic Technologist (or equivalent term)	Entry requirement: “Ordinary” level (or equivalent - the usual requirement for paramedical education in developing countries – normally 11 years schooling)	Training: 3 years formal structured - lower than degree level

Table 1: ISPO professional standards

5. Program activities, progress and results

5.1. Scholarships

Original Agreement	Final outcome
113 Scholarships 35 Category I scholarships 78 Category II scholarships	112 Scholarships 17 Category I scholarships 95 Category II scholarships

Our successful scholarship program had candidates from 34 different developing countries who studied in selected regional training institutes in 7 developing countries as shown in Table 2. The partner training institutes are all based in low income or lower middle income countries (defined as developing countries) and accept international students from other developing and post-conflict countries.

Partner Training Institute	Country	ISPO Category recognition	Number of scholarship awards
Cambodian School of Prosthetics and Orthotics (CSPO)	Cambodia	II	19
Ecole Nationale des Auxiliaires Medicaux (ENAM)	Togo	II	9
Mobility India (MI)	India	II	28
Pakistan Institute of Prosthetics and Orthotics Science (PIPOS)	Pakistan	II	11
Tanzania Training Centre for Orthopaedic Technologists (TATCOT)	Tanzania	II	11
Tumaini University (TU)	Tanzania	I	17
University of Don Bosco (UDB)	El Salvador	I & II	1
Vietnamese Training Centre for Orthopaedic Technologists (VIETCOT)	Vietnam	II	22

Table 2: Scholarship award overview

These partner training institutes were responsible for the recruitment and submission of scholarship applications to ISPO. ISPO used strict application criteria to ensure that candidates had the right academic and personal attributes and attitudes to enter the profession. Training partners welcomed people with a disability to apply for their courses. Selection was done by an ISPO/USAID steering committee based on set selection criteria that had been strengthened and formalised in 2011 as part of quality improvement with the publication of a scholarship application guide. The criteria included:

- Good/very good academic grades in mathematics, science subjects and the language of tuition
- A strong personal statement from the candidate about their motivation for proposed study on the course
- A clear commitment from the candidate to go back to their home region/country to work for at least 3 years
- A letter from a government or an employer stating they will employ the candidate for at least 3 years after graduation
- Commitment from a sponsor stating that they will cost share and cover the costs of at least one annual round-trip travel home for vacation (this could be from government, the future employer, non-governmental organization or the candidate)
- Strong academic and character references about the candidate.



118 candidates joined their programs of study. 6 candidates dropped out (Figure 1) and 112 completed their scholarship terms. Of these, 108 have already graduated from the program and 4 candidates are still in their final year of study in 2016. The wide geographical spread of the resulting graduates is shown in the map on page 8. 11 scholarship graduates declared that they had a disability.

Only 23 of the scholarship candidates were women despite recruitment procedures by the training programs being gender neutral. Awareness of the profession is low amongst women. Many developing countries are paternalistic societies where more male than female candidates apply for career enhancing opportunities. Additionally male candidates from such settings are likely to have had better access to school education and are more able to submit applications for professional training. Another factor contributing to gender inequality is that prosthetics and orthotics combines the disciplines of medicine and engineering and there may be cultural barriers to women learning technical engineering subjects.

Many different employers, governments, organizations and individuals provided cost share agreements. The two most significant cost share partners were the Special Fund for The Disabled and 500 miles who in addition to travel costs, covered living and other costs for candidates.

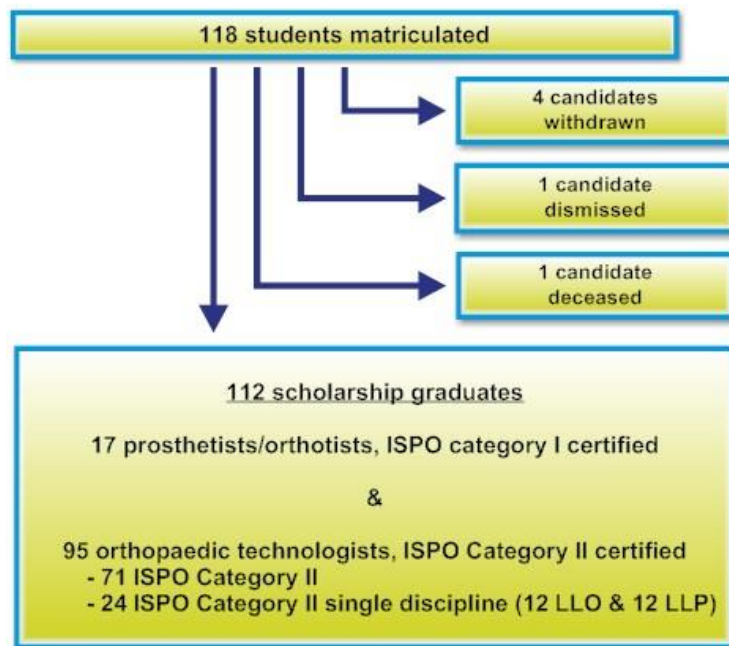


Figure 1: Flow chart showing scholarship student progress



ISPO-USAID Scholarship Graduate Profile: Miss Sokhna Fall

Head of Orthopaedic Department of Dakar, Senegal, Africa (a national reference centre). Graduated from the Bachelor of Science in Prosthetics and Orthotics, Tumaini University, Tanzania in 2013, an ISPO Category I certified program.

Sokhna has a weakness in her leg caused by polio and wears a Knee Ankle Foot Orthosis. She says *"My disability does not affect me, really – I forget about it"* but she is very aware that she had to be very strong to earn a place to train as a prosthetist/orthotist. Now she has graduated and is the only female Category I Prosthetist/Orthotist in the whole of West Africa.

Sokhna says, *"Most people have not heard of this potential career which is why I think it is important that the government runs courses encouraging employers to accept women in technical roles and also encourage women to take up training. I would really like women to realise that what a man can do in this role of assistive technology, a woman can also achieve! I would love women to embrace this as a new career"*.

also encourage women to take up training. I would really like women to realise that what a man can do in this role of assistive technology, a woman can also achieve! I would love women to embrace this as a new career".

Sokhna is a true role model as she backs up her words with actions. She currently supervises 17 orthopaedic technologists and bench workers (all male), works with partner relationships and still gets involved in hands on practice. All the patients in clinic meet Sokhna first for screening and allocation to a team member for further assessment and treatment (*image, right*). The team see on average 6 to 7 prosthetic clients, 35 orthotic (including 4 spinal) and 3 wheelchair or assistive devices cases each week. To stay involved Sokhna treats 2 prosthetic and 6 orthotic cases each week with the help of the technical support team. In addition, she manages the administrative tasks of the workshop including: managing the appointments system; weekly and monthly reporting; supply of raw materials and components; staff management; and partner development. Sokhna continues to appeal for support for her department from potential partners interested in providing assistance and she is delighted that it has recently taken on a new momentum. It looks as though Sokhna will be even busier in the future.



Survey of ISPO-USAID scholarship alumni

Our scholarship program has been running over two USAID funded collaborative agreements. Taken together, the scholarship programs successfully produced 204 graduates from 44 countries graduating between 2006 and 2015. Overall, this represented a significant investment in the rehabilitation services of the developing countries and in the scholarship candidate themselves. Figure 2 shows their country of origin and a wide geographic spread.

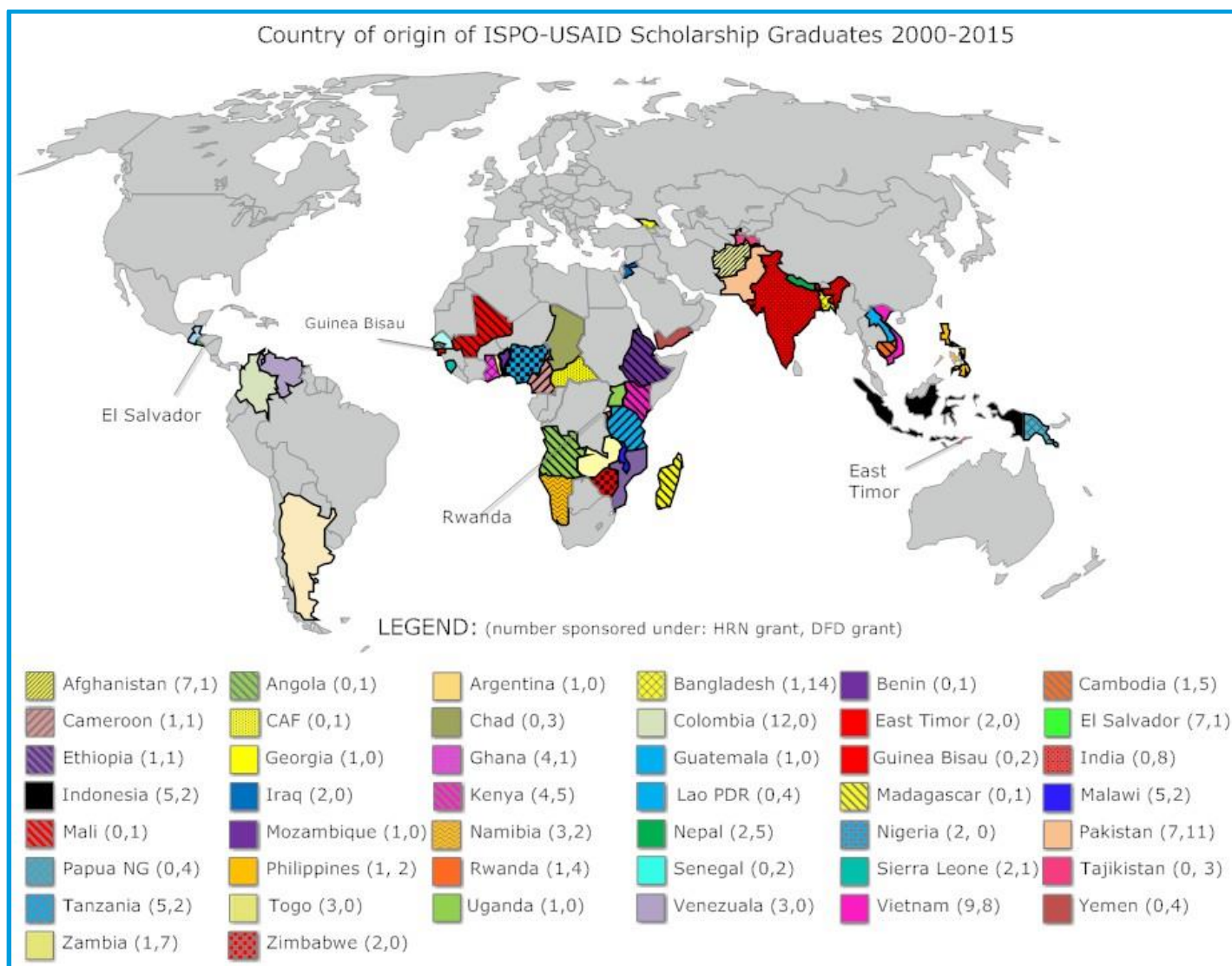


Figure 2

Of the 204 graduates, three received support twice: once in the first agreement period to train in prosthetics and orthotics at ISPO Category II level, and again in the second agreement period to train at ISPO Category I level. A fourth person was supported to train at ISPO Category II level as a wheelchair technologist in the first period and then at ISPO Category II level in prosthetics and orthotics in the second. In total 200 candidates trained in prosthetics and/or orthotics and four in wheelchairs only. 23% of candidates were women.

Survey Method

The Program Steering Committee discussed the importance of knowing the destination of scholarship graduates especially as only anecdotal data on the destination of scholarship alumni existed. They decided that a survey should be conducted to understand the employment status of prosthetics/orthotics scholarship alumni across the two programs of scholarship provision.

The Committee agreed the following survey questions:

1. **Are you currently working in prosthetics and orthotics?**
2. **What do you do? (job title and job role)**
3. **How many patients do you see per week? (Prosthetics users? Orthotics users?)**
4. **If you are not working as a prosthetic/orthotic professional, why?**

The ISPO Grant Manager conducted the survey with the assistance of the training program leads who were asked to contact their alumni with the survey questions and send their response to the Grant Manager. The survey commenced in June 2015 and was extended to February 2016 because of the challenges of tracing graduates in developing countries.

Survey Results

The survey focussed on the 200 scholarship alumni of prosthetics and/or orthotics programs and had a survey response rate of 83%. Training programs generally had good personal contact with their alumni and were able to assist with the dissemination of the survey and return of survey responses by email. Taking into account the survey responses and that 4 students were still in their final year, the retention rate of graduates still active in the field of prosthetics and orthotics was 90%.

Survey responses for prosthetics/orthotics scholarship alumni

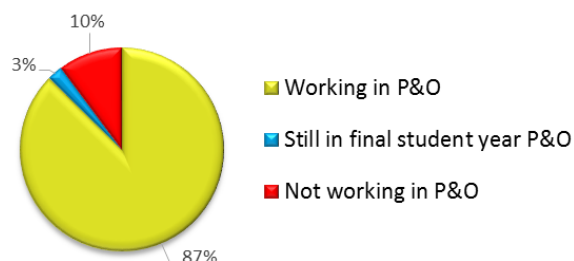


Figure 3

Main job role of alumni working in P&O

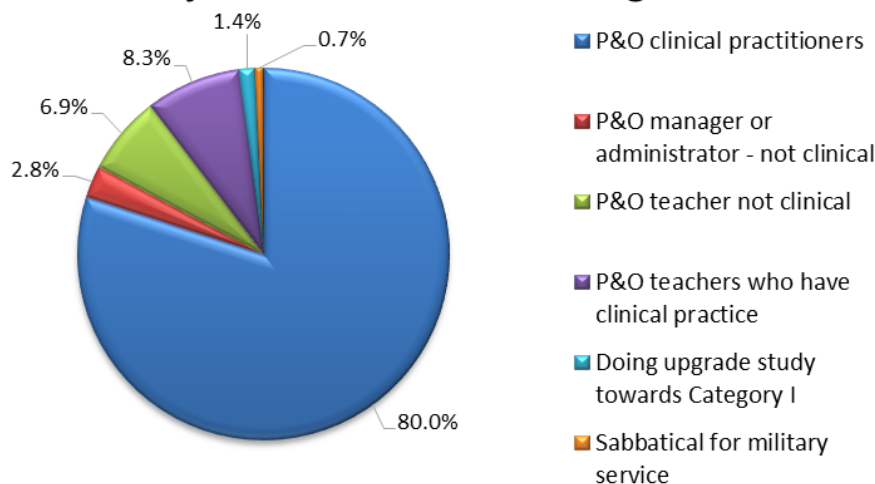


Figure 4

Figure 4 shows that of the 145 survey respondents who reported that they worked in prosthetics and orthotics, 80% worked as clinical practitioners. 15.2% were teachers in prosthetics and orthotics. Over half the teachers also had a regular clinical practice. 4 responses were from non-clinical managers or administrators of prosthetics and orthotics services. 2 graduates were doing upgrade study towards Category I. One person was on sabbatical for military service, but was expected to return to work as an orthopaedic technologist.

Graduates working in P&O clinical practice: Respondents working in clinical practice reported that they saw an average of 16 patients per week ranging from 2 patients to 45 patients per week. Overall these practitioners saw an equal number of prosthetic and orthotic patients per week (Table 3). Alumni working as teachers in prosthetics/orthotics training programs who had a clinical case load saw on average 6 patients per week, ranging from 2 patients to 12 patients. The ratio of prosthetics: orthotics patients for teachers is 1: 2.

	Average number of patients seen per week (n=)			Range (n=)	
	Average overall	Average prosthetic	Average orthotic	low	high
P&O clinical practitioners	16	8	8	2	45
P&O teachers who have clinical practice	6	2	4	2	12

Table 3: number of patients seen per week per graduate

Some of the graduates reported that the number of people they were able to treat was hampered by a lack of components or funding. Three recent graduates who had just started in P&O clinical practice, had not yet developed a clinical case load and were on casual contracts awaiting confirmation of permanent contracts.

Graduates not working in P&O:

17 graduates were not working in P&O and their employment situations were:

- 5 graduates from Vietnam who were working as physiotherapists gave explanations that the salary in P&O was too low and that the “P&O workshop has not been set up in my hospital until now”.
- 6 graduates reported that they had been jobless since graduation, indicating reasons of a severe war in Yemen (2), no permanent job offer in Zambia (2), no permanent job offer in Tanzania (1) and no permanent job offer specifically related to lack of recognition of qualification in Afghanistan (1).
- 3 graduates were working in another field. This included 2 graduates from East Timor who were either working with people with disabilities (1) or with the UN (1), and 1 was working with the Nepal government as a computer operator.
- 3 graduates reported they were not working in P & O, but no other details were given.

Job titles: A wide range of professional and positional job titles were used by graduates. Senior positions were named as Head of Department, Chief Prosthetist/Orthotist, Lead Prosthetist/Orthotist, Chief Orthopaedic Technologist, Managing Director, Assistive Device Coordinator, Laboratory Coordinator, Coordinator, Technical Director, Workshop Chairperson and Orthopaedic Workshop Supervisor.

The job titles Prosthetist/Orthotist and Orthopaedic Technologist were used for both Category I and Category II certified graduates. The following terms were also used to describe jobs in clinical practice: Prosthetics and Orthotics Specialist, Prosthetics and Orthotics Technician, Prosthetic/Orthotic Technologist, Certified Prosthetist/Orthotist, Ortho-prosthetist Technician, Health Scientist, Health Assistant, Technical Officer, Senior Orthopaedic Assistant, Orthotist, Senior Prosthetics Assistant, Orthopaedic Assistant, Orthopaedic Technician, Lower Limb Prosthetic Technologist, Lower Limb Orthotic Technologist, Resident and Internship.

Job roles were described by most respondents and these aligned with the ISPO Category I and II professional profiles. Those in more senior positions had additional management tasks.

Summary of problems/obstacles encountered:

The greatest challenge in our scholarship program was in ensuring that complete applications were received. At the start, we often found that some element of evidential paperwork was missing. In order to address this, we strengthened our communications and developed a scholarship application guide and checklist that was sent to all training partners. We also made conditional offers which relied on the full submission of paperwork. This helped us to achieve our targeted scholarship award numbers.

Lessons learned, best practices and recommendations for future programming:

Our main points of contact for all the scholarships were the training program partners themselves. We tended not to communicate directly with students during their training, but with key contacts representing the training partners. This approach proved to strengthen the administration of the training program and the involvement of the training partners in progress reporting and the follow up of scholarship alumni.

The survey was very useful as it informed us of the outcome of scholarship provision. Even considering a worst case scenario where a ‘no response’ represented a graduate no longer working in the field, the proven retention rate for prosthetics/orthotics alumni active in the prosthetics/orthotics field was 74.5%. However, anecdotal reports of graduates moving country or just not responding led us to believe that the actual retention rate may be even higher, at around 80%.

Most graduates returned to their home country to work in prosthetics and orthotics. Of those who responded, only 3% of graduates reported that they had eventually moved country. None of these graduates moved to high income countries

from their home countries. The graduates had moved to more senior clinical, management or teaching jobs in low income or lower middle income countries, reflecting a dedication to their profession and a desire for career progression.

Attrition: It is important to explore reasons for attrition. 10% of graduates who returned a survey response indicated that they were not working in P&O either because of non-voluntary or voluntary attrition.

Non-voluntary attrition arose because graduates had not been offered a permanent contract in their home country, despite scholarship awards which expected graduates to have employment status at the point of graduation. Reasons for non-employment were: a national job freeze in government posts in Zambia; unfulfilled job expectations in Tanzania and Afghanistan; and an unstable situation because of conflict in Yemen. New graduate employment and deployment was reported to be slow or uncertain in some cases of those now in full time positions. One graduate explained *“returning home I was unable to find employment...after a year and 4 months I was finally successful in finding employment”*. Another reported *“for now I am not working, I volunteer”*.

Voluntary attrition arose when graduates moved to another job type. Reasons for voluntary attrition were not given, other than for 5 graduates from Vietnam who were employed as physiotherapists rather than orthopaedic technologists as the prosthetics/orthotics department had not been set up in their hospital and/or because of too low a salary in the field.

Job roles: Graduates clearly described their job roles in a similar way to the ISPO professional profiles of prosthetist/orthotist or orthopaedic technologist. This indicated that the graduates had a distinct professional role in delivering prosthetics and orthotics services.

Job titles, professional titles, recognition and development of professionals: Thirty different job titles were used by graduates surveyed. This may reflect a weak professional identity among professionals, a lack of recognition between professionals and their employers and a lack of active professional societies. Although all graduates are clinicians, they often referred to their job title as “technicians”. This gave a false impression of their work in delivering prosthetics and orthotics services directly to patients. Graduates are clearly allied health professionals and should be employed, positioned and recognized as being clinicians.

Capacity to treat patients: 80% of graduates were clinical practitioners treating on average 16 patients per week with a range of 2 to 45 patients reported. It is known from our impact assessment studies that the balance of clinical and technical aspects of the job vary from service to service and this could, in part, account for the different numbers of patients treated. For example, prosthetists/orthotists and orthopaedic technologists in some developing countries often do both the clinical and technical aspects of the job, while others predominantly do clinical work supported by technicians who manufacture devices. However, the capacity of some graduates is underutilized and some reported that a lack of finances and availability of components limited the number of people they could treat, for example *“we have many orthotic clients but the main problem is we have no sponsor and no one to pay for that”*.

The survey results offer new insights into the retention and jobs of prosthetists/orthotists and orthopaedic technologists in developing countries. For the majority of scholarship candidates, a positive outcome from the scholarship investment was realised with at least 74.5% of alumni still working in the field of prosthetics and orthotics. The survey results can help to inform future scholarship provision and workforce planning.

The survey results reveal that significant development of the prosthetics and orthotics sector is needed. The following areas of development are needed in future programming:

- There is disconnect between the demand, need and supply of clinicians in prosthetics/orthotics services.
- The capacity of ISPO certified graduates is underutilised as evidenced from some graduates reporting low number of patients per week.
- Improved recruitment and retention strategies are needed for new graduates. This could address non-voluntary attrition from the sector associated with delayed or non-employment of new graduates.
- For all graduates, local and national standards around pay and conditions should be developed on a par with national standards for other allied health professionals, for example physiotherapists.

- There needs to be agreement on the use of professional titles which should then be aligned with job titles. Greater recognition at local and national levels is important and requires discussion and cooperation between both clinicians and employers.

5.2. Measuring the impact of training in prosthetics & orthotics

Original Agreement	Final outcome
<p>Development of a graduate and employer questionnaire. To evaluate:</p> <ul style="list-style-type: none"> • Appropriateness of education and training for professional requirements of the service, impact for graduate, disabled person's organizations and society. • Information for the school to improve educational programs • Differences in graduates Category I versus Category II from the same school <p>Impact on end-user of consumer compliance follow up. To evaluate:</p> <ul style="list-style-type: none"> • Most appropriate Quality Of Life (QOL) questionnaires • Technical quality of devices delivered by school leavers • Relationship between user compliance and quality of work • Relationship between quality of life and user compliance • Applicability of QOL form: for Community Based Rehabilitation workers; for providing information about technical quality • Analyse Category I supervised graduates in a controlled environment versus non supervised single employees. 	<p>Development of a structured interview and field visit format for use with graduates and their clients, government ministry officials, hospital directors and heads of service. This evaluated:</p> <ul style="list-style-type: none"> • Appropriateness of education and training for professional requirements of the service, impact for graduates, their clients and services. • Information for the school to improve educational programs • Differences in graduates of face-to-face versus blended learning programs from the same school • Differences between Category I versus Category II personnel from the same school <p>Impact on the end user: Evaluated through:</p> <ul style="list-style-type: none"> • Client stories • Graduate understanding of client needs • Graduate understanding of how provision of prosthetics and orthotics services affects clients • Graduate understanding of the technical quality of their devices <p>Impact on services: Evaluated through</p> <ul style="list-style-type: none"> • The need for continuing professional development • Different prosthetics and orthotics sector issues in different country and regional contexts.

An extensive program of impact assessment studies was conducted. We wished to determine the impact of training personnel to the minimum standards ISPO Category I and II. Our main interest was to test the following hypothesis in developing countries:

Training personnel to ISPO Category I and II standards provides basic knowledge, skills and experience to enable them to provide and/or improve prosthetic and orthotic services for persons with physical disabilities.

Our baseline data came from the ISPO Standards, and assumed that all graduates had been certified at the level of the standards having passed an ISPO examination procedure.

Impact assessment method

We developed a causal model and framework of assessment and conducted field visits to thirteen countries. There we interviewed Ministry Officials, Heads of Hospital Services and Heads of Prosthetic and Orthotic Departments using a structured interview format. We also conducted a partial audit of 144 graduates' clinical skills and competencies with 170 clients and determined graduate professional development needs.

We also heard from the clients how services had impacted upon their lives. Table 4 shows an overview of study participants.

Study	Number of study participants				
	Graduates Cat I	Graduates Cat 2	Prosthetic clients	Orthotic clients	Additional client stories
Vietnam (VIETCOT graduates)	1	28	39 (split not reported)		0
Tanzania, Kenya and Uganda (TATCOT graduates)	7	18	15	5	5
Mexico, Guatemala & Colombia (UDB graduates)	3	24	22	5	3
Cambodia & Laos (CSPO graduates)	1	16	9	8	5
India & Bangladesh (MI graduates)	0	24	14	15	5
Togo & Benin (ENAM graduates)	1	21	10	10	0
Total	13	131	70	43	18
	Total Graduates		Total clients		
	144		170		

Table 4: Impact Assessment study – participant overview

Impact assessment results

Six detailed reports for each study were published in the following order, with the first study led by Dr John Fisk determining the method to be used in the other reports:

- ISPO/LWVF Evaluation team VIETCOT graduates report⁴.
- Prosthetics & orthotics impact assessment: East Africa - Tanzania, Kenya and Uganda⁵.
- Prosthetics & orthotics impact assessment: Latin America - Mexico, Guatemala and Colombia. Published in English and Spanish⁶.
- Prosthetics & orthotics impact assessment: South East Asia - Cambodia and Lao PDR⁷.
- Prosthetics & orthotics impact assessment - India and Bangladesh⁸.
- Prosthetics and orthotics impact assessment: West Africa - Togo and Benin⁹.

Each report contains recommendations specific to the graduates, country and training program under observation.

In all the countries we found that prosthetic and orthotic provision enabled people with disabilities to have greater independence in their lives. This included accessing all kinds of education and employment. We sourced 18 client case stories in the impact assessment reports^{5, 6, 7, 8} and found these to be powerful tools in their own right to determine the impact of training.

ISPO Category I and II graduates were found to have a positive impact on access to services. ISPO Category I graduates worked at a more senior level. They were able to lead and advise ISPO Category II graduates and were able to handle more complex cases.

The majority of graduates were able to correctly appraise their own work and knew where improvements could be made. In general, the quality of treatment was found to be satisfactory with graduates conducting their professional work to the expected standards.



Adul's story is told in the India and Bangladesh report. He uses bilateral trans-tibial prosthesis to access both work and study.

Summary of problems/obstacles encountered:

Our selection of country field visits initially included an impact assessment study in Pakistan, but this could not go ahead on the proposed dates in 2013 because of security concerns at that time. As a result other studies were planned to replace it.

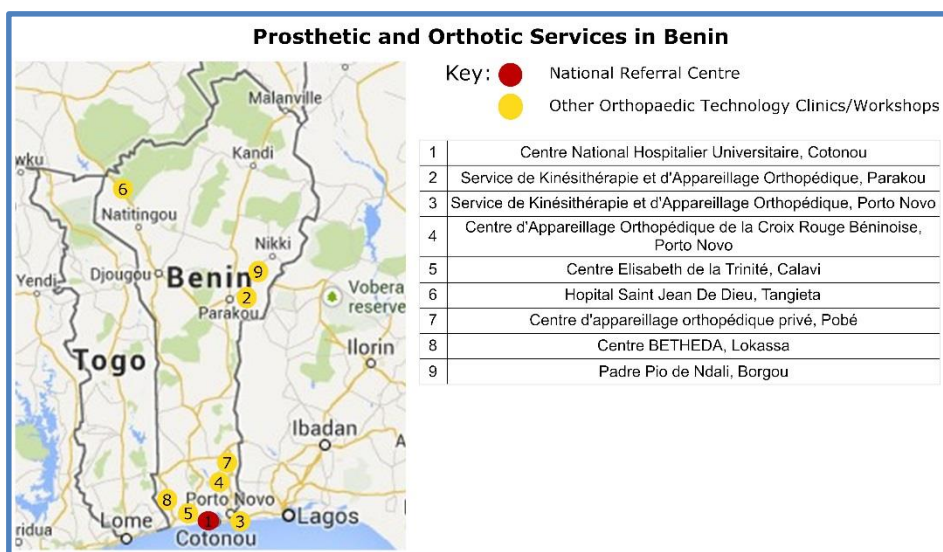
Setting up six study teams and then conducting field visits to fourteen countries to undertake impact assessments was challenging. In each country, the study involved visiting a range of services and officials to conduct an intense, multi-level study. The logistics involved liaising with different co-ordinators and researchers and scheduling visit appointments. We are indebted to the impact assessments teams, study team leads, local co-ordinators and hosts for undertaking this research.

Lessons learned, best practices and recommendations for future programming:

We found compelling evidence that the ISPO evaluated professional training programs prepare their graduates to provide and/or improve prosthetic and orthotic services. Prosthetics and orthotics services employ prosthetists/orthotists and orthopaedic technologists certified as ISPO Category I and ISPO Category II level practitioners. This assures a minimum standard of professional practice on first employment. Most importantly, graduates enabled the end user of prosthetic and orthotic devices to be included in and participate more fully in society. ISPO certified graduates were able to demonstrate an appropriate quality of prosthetic/orthotic treatment and recognised where they needed and wanted to develop their professional practice. Table 4 (page 13) shows an overview of all our study participants.

Two comparison studies were done:

- We considered whether there were any differences between the quality of fit of devices made by graduates from face-to-face programs compared to blended learning programs from the University of Don Bosco ISPO Category II courses. An analysis of investigator observations about fitting issues for the graduate made devices was conducted. The results showed there was no statistical association found between the mode of learning and the quality of fit of prosthetic and orthotic devices⁶.
- We considered the differences in roles between Category I contrasted with Category II personnel from the same school. We investigated this issue in the Tanzania, Kenya and Uganda report⁵ and also in the Mexico, Guatemala and Colombia report⁶ because TATCOT and UDB were the only two schools in the study that had Category I and II alumni. We found that ISPO Category I personnel usually had more senior roles, including management, teaching and mentoring roles. They also saw more complex client cases than ISPO Category II personnel.



One activity in the studies that was not in the initial methodology was that we were able to map the location of prosthetics and orthotics services in the countries visited.

This information was not readily available from other sources for most of the countries visited. This useful national information could help people living in those countries who need services to find out about service locations.

Figure 5: Example of a mapping of service locations

Theme analysis

We undertook a theme analysis across all the impact assessment reports. We make the following recommendations in four themes in the context of developing country situations:

Theme 1: Leadership and Governance – recommendations

- a. Leadership, change management and strategic planning skills are needed to develop graduates who are service managers (both ISPO Category I and II).
- b. ISPO certified graduates should work together to advocate for national recognition of the profession, state registration and alignment with a career structure.
- c. A standardized programme of induction training and mentoring for new graduates should be designed and promoted by ISPO.
- d. Improved models and practice in the financial and operational management of prosthetics and orthotics services are needed in developing countries.
- e. National tendering and procurement should be better understood to establish and stabilise the market for prosthetics/orthotics education, post-professional training, technologies and services.

Theme 2: Workforce – recommendations

- f. Stronger international guidance is essential for national workforce planning. Workforce planning in prosthetics and orthotics would determine the number and mix of prosthetists/orthotists and orthopaedic technologists for national and local service delivery.
- g. Scholarship provision supports those in developing countries to access professional education. Efforts should be made to build the number of ISPO Category I and II students who have fees and living costs sponsored for the duration of their study. This would be in support of local and national capacity building initiatives, professional recognition and guaranteed work places following graduation.
- h. ISPO should develop and promote a career framework for graduate orthopaedic technologists and prosthetists/orthotists. Guidance should include:
 - Salary levels for orthopaedic technologists and prosthetists/orthotists commensurate with national professional salary reimbursement and lifted in accordance with specialist and promoted working. This will help to address issues of motivation and retention in the professions.
 - The career pathway for the prosthetics/orthotics workforce should be more clearly developed with routes to upgrade ISPO Category II to ISPO Category I personnel.
- i. Training programmes should pursue and maintain recognition as providers of ISPO Category I and ISPO Category II training. This contributes to assuring the quality of care provided by ISPO certified graduates to people with disabilities.
- j. ISPO should continue to expand activities in support of consultations and evaluations for ISPO Category II and ISPO Category I programmes.
- k. ISPO certified graduates should continue to learn and develop in the years after graduation. They should ensure that they strengthen their skills, especially in patient assessment, goal setting, fitting, alignment and follow up.
- l. ISPO Category I personnel destined to be clinical leaders need additional experience, training and support to develop their practice.
- m. New and experienced clinicians should be encouraged to participate in continuous professional development.

Theme 3: Service Provision – recommendations

- n. National referral centres for prosthetics and orthotics have a key role in leading on national benchmarks of service. They should work closely with prosthetics and orthotics training institutes to ensure close parallel developments occur in clinical and educational provision. These centres should have a multidisciplinary workforce and should include ISPO Category I personnel. The centres would have a role to support the care of complex cases, provide national advice and leadership and may also develop specialist services (for example paediatrics). They should work closely with other institutions such as universities to guide, refine and research clinical practice.
- o. The importance of a cross-disciplinary team approach to delivering prosthetics and orthotics services is clear. It provides more holistic and appropriate assessment and treatment options than a uni-disciplinary approach alone.

Regular case conferences in the workplace provide the opportunity for orthopaedic technologists and prosthetists/orthotists to communicate with physicians and therapists for treatment planning.

- p.** Professional communities, associations and networks in prosthetics and orthotics should be encouraged to contribute to national sector development in prosthetics and orthotics.
- q.** Clinical and technical service manager training in quality control and cost effectiveness is needed to strengthen the culture of control and use of devices, materials, components, equipment and facilities. Cost effective and evidence based practice should be improved leading to the development of more effective working practices and helping to ensure better use of resources.
- r.** ISPO recognized training institutions and graduates should work with their respective governments, hospital directors, organizations of persons with disabilities and other stakeholders to advocate for and support the development of services.
- s.** ISPO certified graduates should agree and support quality improvement plans for prosthetics and orthotics services. This should include quality improvement based on client feedback, for example by satisfaction surveys.
- t.** Support and encouragement for ISPO national member societies and professional bodies to improve the work environment, agree clinical practice standards and advocate for access to services for persons with disabilities.

Theme 4: Practice and Technology - recommendations

- u.** Comprehensive history taking and clinical assessment skills are required to ensure people with disabilities are fully understood so that prostheses and orthoses provision can be properly matched to meet their needs. Clinical record keeping is a duty of prosthetists/orthotists and orthopaedic technologists. All aspects of assessment, treatment plans, treatment goals and progress notes should be documented in the client record. Client records should be managed by the prosthetic/orthotic service. A set of audit tools should be used so that services can audit their quality of clinical record keeping against an agreed standard. ISPO should develop and publish or endorse existing minimum data sets and standards, for clinical record keeping used in prosthetics/orthotics services.
- v.** The quality of fit, alignment and finish of prosthetic and orthotic devices is of paramount importance to achieve optimum comfort for the user, so that they actively use their device. ISPO should develop and promote a series of client evaluation and device quality checkout forms for use by training programmes and services.
- w.** Actions should be taken to broaden the range of appropriate prosthetic and orthotic components, materials and technologies for use in developing countries.
- x.** ISPO clinical practice standards in client assessment, fit and alignment could be developed and published for use as a learning resource in pre-professional and postgraduate formal and informal training.
- y.** Orthopaedic technologists and prosthetists/orthotists should keep up-to-date with technology and techniques in prosthetics and orthotics. They should maintain and develop their skills, knowledge and understanding of prosthetics/orthotics after graduation. As professionals they should recognise that their training has been evaluated by ISPO as being at a minimum standard and they must strive to develop and improve themselves and their clinical and technical practice.
- z.** Evidence based practice should be more strongly implemented to ensure the right treatment is provided at the first consultation and to prevent the use of unproven treatments. Leadership and training in locating and using evidence in practice is needed.
- aa.** New routes to access alternative technologies, materials and consumables should be determined to benefit the local/service patient population. (Note new training and equipment might be needed).
- bb.** ISPO National Member Societies have a role to play in showcasing a range of technologies and new techniques at national events.
- cc.** Training and mentoring of graduates in clinical techniques can positively influence quality issues in prosthetics and orthotics.
- dd.** Mentoring and experiential learning with more skilled clinicians can improve the skills and confidence of ISPO certified graduates.
- ee.** ISPO and ISPO national member societies should continue to deliver short courses that have multidisciplinary faculty and participants.
- ff.** ISPO should actively encourage ISPO certified graduates to become members of ISPO.

5.3. Enhancement of prosthetics & orthotics service provision

Original Agreement	Final outcome
<p>Collect qualitative information globally on the collaboration between services providing assistive devices to people with physical disability and community based rehabilitation, as well as qualitative information about training Community Based Workers and P & O personnel.</p> <p>Conduct quality-of-life studies in the field by the use of Community Rehabilitation Workers.</p> <p>Organise a consensus conference about the enhancement of P & O service provision and accessibility with a focus on further advancing the ISPO & WHO joint position paper on the relationship between prosthetics/orthotics services and CBR.</p>	<p>Progress towards Standards for Prosthetics and Orthotics Service Provision Working in support of WHO.</p> <p>Activities completed</p> <ul style="list-style-type: none"> • development of work plan • initial scoping and review of the literature • set up and meeting of the Standards Development Group • systematic reviews on effectiveness of prosthetics and orthotics services and service delivery.

When this Collaborative Agreement was originally agreed in 2008, it included a proposal for actions around Community Based Rehabilitation. This program activity was discussed by the ISPO-USAID Steering Committee and it was decided that because of progress by the World Health Organization (WHO) in achieving their publication Community-Based Rehabilitation Guidelines in 2010¹⁰, that instead guidance should be developed for prosthetics and orthotics. We worked in partnership with WHO throughout a three-year preparation to find a way forward and provide technical advice. In 2015 WHO received clearance to develop a new information product in the form of 'Standards for Prosthetics and Orthotic Service Provision'.

The standards are about prosthetics and orthotics services for people with physical impairments to maintain or improve their functioning and independence, facilitate participation, and enhance overall well-being. The proposed 'Standards for Prosthetics and Orthotics Service Provision' will support the Member States to implement the UN Convention on the Rights for Persons with Disabilities - especially *Article 20: Personal Mobility and 26: Habilitation and Rehabilitation* and WHO's Global Disability Action Plan 2014-2021 - especially in realizing *objective 2 – to strengthen and extend rehabilitation, habilitation, assistive technology, assistance and support services, and community-based rehabilitation*. They will cover a key sector of assistive technology – prosthetics and orthotics services. It aims to assist stakeholders with developing, expanding and improving the quality of prosthetics and orthotics services.

Systematic Reviews

Following a Request for Proposals, two systematic reviews of the literature were completed by two different systematic review teams to help inform the development of the new World Health Organization Standards for Prosthetics and Orthotics Service Provision.

Both review teams included a wider network of reviewers giving in kind support to this important work stream. Representatives of the review teams joined a meeting of an expert WHO Standards Development Group to present and discuss their preliminary findings in Bangkok, Thailand in November 2015.

Systematic Review 1 addressed **Effectiveness and cost effectiveness of prosthetics and orthotics services**. This review team was led by Professor Nachiappan Chockalingam from Staffordshire University, England with significant input from his colleague Dr Aoife Healy. This review was funded by this collaborative agreement.

Systematic Review 2 addressed **Competencies needed to deliver and manage quality prosthetics and orthotics services and prosthetics and orthotics service delivery (standards and models)**.

This review team was led by Professor Richard Baker from the University of Salford with significant input from Associate Professor Saeed Forghany and Dr Ebrahim Sadeghi-Demneh from Isfahan University of Medical Sciences, Iran and Dr Karl Landorf from La Trobe University, Australia.

The review team members from the Universities of Salford and La Trobe were funded through this collaborative agreement. To facilitate their participation in this international project, the Isfahan University of Medical Sciences funded their review team members' time with the World Health Organization supporting costs to attend the standards development group meeting.

The reviews have helped to inform the content of the standards and have been prepared for submission to peer assessed journals for publication by the authors.

WHO Standards Development Group meeting November 9-12, 2015. Bangkok, Thailand

ISPO supported the organization of this meeting in partnership with the Faculty of Medicine Siriraj Hospital, Mahidol University, Bangkok, Thailand and WHO.



Following introductory talks, an outline content for the standards was discussed and agreed by the delegates (named in Table 5).

The systematic reviews were then presented to the WHO Standards Development Group members and observers. In depth facilitated group discussions about the evidence on specific topics followed. Group notes were made on flip charts or slide presentations and these were digitally recorded. Each group then presented a summary of their discussions in a plenary session. This was followed by plenary discussion. Notes of plenary discussions were made. Notes of the meeting have been submitted to WHO to be used as raw data to inform the content of the standards.

Delegates: WHO Standards Development Group Meeting, Bangkok, Thailand. 9 -12 November 2015				
	Title	Name	Family name	Affiliation
Standards Development Group Members				
1	Mr	Girma Bireda	Assena	Instructor, Orthopaedic Technique Vocational and Educational Training College, Ethiopia
2	Prof	Josephine	Bundoc	Head Prosthetics & Orthotics Service, University of the Philippines, Philippines
3	Dr	Mary Anne	Burke	President & Chief Executive Officer of BIAS FREE Co-operative, Canada
4	Dr	Bishnu	Dhungana	Gender and Disability Consultant, Nepal
5	Mrs	Elaine	Figgins	Strategic Lead, National Centre for Prosthetics and Orthotics, University of Strathclyde, Scotland
6	Mrs	Ritu	Ghosh	Deputy Director Training, Mobility India, India
7	Mr	Allen	Ingersoll	Prosthetics Consultant, Gaza
8	Assoc Prof	Ev	Innes	Allied Health Lead, Associate Professor Occupational Therapy, Southern Cross University, Australia
9	Assoc Prof	Friedbert	Kohler	Conjoint Associate Professor, University New South Wales, Australia
10	Prof	Malcolm	MacLachlan	Director, Centre for Global Health, Trinity College, Dublin, Ireland
11	Mr	William	Neumann	Prosthetics/Orthotics Consultant, USA & Thailand
12	Mr	Teap	Odom	Deputy to the Country Director, The Cambodia Trust, Cambodia
13	Dr	Wesley	Pryor	Senior Technical Advisor, Rehabilitation & Inclusive Health Systems. University of Melbourne, Australia
14	Mr	Youssef	Salam	Prosthetics Consultant, Lebanon
15	Dr	Daniel	Suarez	National School of Orthotics and Prosthetics, Argentina
16	Mr	Claude	Tardif	Head of the Physical Rehabilitation Programme, ICRC, Switzerland
17	Dr	Nils-Odd	Tønnevd	President, International Confederation of Amputee Associations, Norway
Observers				
18	Mr	Anders	Eklund	Prosthetics/Orthotics Consultant, France
19	Dr	Björn	Ekman	Health Economist, Lund University, Sweden
20	Prof	Rajiv	Hanspal	Consultant in Rehabilitation Medicine, Royal National Orthopaedic Hospital, Stanmore, England. President, ISPO
21	Mr	Carson	Harte	Chief Executive, Exceed, UK. Standards Working Group, ISPO Education Committee
22	Mr	Rob	Horvath	Special Adviser for Children in Adversity. Division Chief Empowerment & Inclusion, USAID, USA
23	Assoc Prof	Nisarar	Opartkiattikul	Director, Sirindhorn School of Prosthetics & Orthotics, Mahidol University, Thailand
24	Mrs	Sandra	Sexton	Prosthetics/Orthotics Consultant, ISPO Grant Manager, Scotland
25	Mr	Bengt	Söderberg	Managing Director Scandinavian Orthopedic Laboratory, Sweden. Past President, ISPO.
Systematic Reviewers				
26	Prof	Richard	Baker	Professor of Clinical Gait Analysis, School of Healthcare Science, University of Salford, England
27	Prof	Nachiappan	Chokalingam	Professor of Clinical Biomechanics, Staffordshire University, England
28	Assoc Prof	Saeed	Forghany	Associate Professor, Isfahan University of Medical Sciences, Iran
29	Dr	Aoife	Healy	Senior Research Officer, Staffordshire University, England
30	Dr	Ebrahim	Sadeghi-Demneh	Lecturer/Researcher, Isfahan University of Medical Sciences, Iran
Attending representatives of the World Health Organization Steering Group				
31	Dr	Alarcos	Cieza	Coordinator, Disability and Rehabilitation, WHO
32	Mr	Chapal	Khasnabis	Technical Officer, Public Health, Innovation and Intellectual Property. Essential Medicines & Health Products,
33	Mr	Andrea	Pupulin	Technical Officer, Public Health, Innovation and intellectual Property. Essential Medicines & Health Products,
Local co-ordinators				
34	Ms	Jutamat	Pinitlertsakun	Lecturer, Sirindhorn School of Prosthetics and Orthotics, Mahidol University, Thailand
35	Ms	Thatchanan	Manopetchkasem	Senior Educator, Sirindhorn School of Prosthetics and Orthotics, Mahidol University, Thailand

Table 5: Delegates of the WHO Standards Development Group meeting: Standards for Prosthetics and Orthotics Service Provision

The programme of the four-day meeting had the following schedule.

Day 1. Monday 9 November 2015

- 1.1 Inaugural welcome session
- 1.2 Introductions
- 1.3 The need for World Health Organization Standards for Prosthetics and Orthotics
- 1.4 Standards methodology, decision making & voting processes
- 1.5 Table of contents for the standards
- 1.6 Systematic Review on effectiveness
- 1.7 Discussions on effectiveness

Day 2. Tuesday 10 November 2015

- 2.1 Systematic Review on competencies
- 2.2 Discussions on competencies

Day 3. Wednesday 11 November 2015

- 3.1 Systematic Review on cost effectiveness
- 3.2 Discussions on cost effectiveness
- 3.3 Discussions on leadership and governance
- 3.4 Discussions on oversight and regulation

Day 4. Thursday 12 November 2015

- 4.1 Systematic review on service delivery models
- 4.2 Discussions on service delivery models
- 4.3 Discussions of service delivery structure
- 4.4 Discussions on patient centred care
- 4.5 Discussions on information



Images show small group discussions. Standards Development Group members divided into four different smaller groups to discuss nine topics. Each group then presented a summary of their discussion in a plenary session.

Summary of problems/obstacles encountered:

The task of agreeing to develop 'Standards for Prosthetics and Orthotics Service Provision' was complicated as few standards have been published based on the Health Systems Strengthening Approach. Time had to be invested looking through various handbooks and regulations to consider what this publication might look like.

Expenditure was much higher than anticipated with any savings from other budget lines used to support the standards work in agreement with the ISPO-USAID steering committee.

Lessons learned, best practices and recommendations for future programming:

The work of publishing the WHO standards will continue for a further 18 months coordinated by WHO. A publication launch is expected by May 2017 at ISPO's 16th World Congress in Cape Town, South Africa.

6. Budget & expenditure

A comparison of actual expenditures with budget estimates, including analysis and explanation of cost overruns or high unit costs, and any other pertinent information.

Budget line item	Original budget to 2013	No cost extension agreed budget to 2015	Actual Expenditure	% variance compared to no cost extension agreed budget	Note
Scholarships	2,951,650	2,703,283	2,573,473	-4.8%	1
End user and quality of life follow up	174,916	155,935	136,123	-12.7%	2
Standards	132,604	132,605	267,085	101.4%	3
ISPO Administration	423,692	691,039	685,138	-0.9%	4
TOTAL	3,682,862	3,682,862	3,661,819	-0.6%	5
Cost share requirement	179,153	179,153	246,321	37%	6

Table 6

Notes

- Scholarship spend was down 4.8% due some scholarship students failing to progress in their studies. Savings made were used for the standards work.
- End user and quality of life follow up spend was down 12.7% due to cost savings.
- Standards costs were more than double at 101.4 %. This is because of the more rigorous requirements of developing standards than had been expected. This included the unanticipated costs of two systematic reviews of the literature that totalled US\$ 127,950.
- ISPO Administration costs was down by 0.9%.
- The total program costs came in 0.6% under budget.
- Due to positive partnership working 37% more was achieved than expected for cost share. This was mainly in the form of cost share for scholarship candidates.

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