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Challenges in Prosthetics and Orthotics Education in Sub-Saharan Africa Francophone Country Togo

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Abstract

Introduction: Limited publications exist concerning prosthetics and orthotics education and service provision in the francophone developing countries. Understanding the current situation in one of the accredited porgramme is essential.

Aim: This study aimed to explore the perceptions of students and alumni regarding the challenges in prosthetics and orthotics programme in a sub-Saharan African francophone country Togo.

Material and Methods: Alumni and current students enrolled in the Prosthetics and Orthotics department at Ecole Nationale des Auxiliaires Médicaux, Lomé Togo were invited to complete a survey in April 2017. The authors analyzed the responses using descriptive statistics to identify emergent challenges in the prosthetics and orthotics field.

Results: Twelve respondents of the alumni and nineteen current students completed the survey. The vast majority of the respondents of each group were male predominance respectively; 11 (91.7%) and 16 (84.2%). The prosthetics and orthotics education in sub-Saharan Africa country Togo faces many challenges mainly related to the lack of continued education, lack of research facilities, and lack of biomechanics devices in the existing training programme. All respondents desired improvements to the prosthetics and orthotics field.

Conclusion: The alumni and current students perceived possible development of Prosthetics and Orthotics in the sub-Saharan Africa country. The education can be more standardized by upgrading the level of education of the local staff and innovate the field by fostering research possibilities.

Keywords: *Prosthetics and Orthotics; Education; Togo*

Introduction

The World Health Organization has predicted that the number of people needing assistive products globally is beyond two billion by 2050 and only one in 10 people in need have access to assistive product [1]. The disability population in the low-income countries represents 80% of the 650 million worldwide living with some form of disability [2]. Projection has been made that by 2035 the population of disabled in low-income countries in needs of rehabilitative service will reach 125 million [3]. The Sub-Saharan Africa population of disabled represents approximately 78 million [4]. Thus, the development and promotion of rehabilitation service in the sub-Saharan African region is necessary. Few colleges across Africa offer courses in prosthetics and orthotics (P and O). At present five Prosthetics

and Orthotics education programmes in Africa have been accredited by the International Society of Prosthetics and Orthotics (ISPO): the Tanzania Training Centre for Orthopaedic Technologists; the Ecole Nationale des Auxiliaires Médicaux (ENAM), in Togo; the Sudanese Diploma in Prosthetics and Orthotics; the Orthopaedic Technique Vocational and Educational Training Programme in Ethiopia and the University of Rwanda [5].

Gaining adequate knowledge to serve as a healthcare professional is very important. However only numbered colleges offer courses related to P and O rehabilitation in low resource francophone country.

ENAM of Lomé is the only training school in Togo and only francophone institution in West Africa accredited by ISPO in 2004. Since its establishment in 1945 the school offers courses in Nursing, Hygiene Technicians, Physical Therapy, Language Therapy and Prosthetics and Orthotics. The P and O department was established in 1977 and has trained so far 234 P and O technicians including 89 Togolese [6]. Little attention was paid to the development of Prosthetics and Orthotics field. The priority was given to the strategic development of immunization, maternal healthcare, child health, adolescent health and control of HIV/AIDS, tuberculosis and malaria [7,8].

Due to unavailability of graduate programme in the country, some of the alumni have continued to ISPO category I or Master degree in Tanzania, France, Germany and Japan. P and O service is highly needed in Africa region where the state of art technology is not yet advanced.

The WHO estimates that about 0.5% of the total population in the developing countries require prostheses or orthoses. Approximately 30 million people need 180,000 rehabilitation professionals [9]. It is estimated in 2005 that only 400 prosthetics were trained annually in the developing countries in the world, which could not meet the need for prosthetic services in the developing countries [10]. In contrast to developed countries like Japan has approximately eleven Universities and Colleges that offer Bachelor and Diploma degrees in P and O. These Universities and Colleges graduate approximately 313 students annually with more than two thousand registered P and O professionals [11]. Japan has more than 600 registered P and O industries providing services countrywide. Some universities offer Masters and Doctoral programmes as well. In addition, P and O technicians have access to research facilities then perform new studies towards the advancement of healthcare practice.

The Republic of Togo, located in West Africa, achieved independence from France in 1960. Togo is a low-resource Francophone country with more than 7 million population where about 69% of the rural households live below the poverty line [12]. There are approximately 630 thousand people or 10% of the Togolese population lives at least with one disability [13]. There are currently 8 centres across Togo with approximately 89 technicians that provide P and O services to the disability population [6]. Due to lack of sufficient centers in the country, the local graduates find it difficult to get employment.

The Diploma course offered at ENAM is a three-year cycle programme which does not allow desired students to enroll at P and O department each year. The school currently enrolled 28 students including foreign students from the neighboring francophone countries. While there is a high demand of P and O professional in the sub-Saharan Africa region, a sustainable education for constant supply of graduates is necessary. Current academic reforms in health training system in Togo has integrated ENAM to the faculty of Sciences of University of Lomé which enables ENAM to deliver Bachelor certificate in three year programme [14]. However, the three-year bachelor training should meet internationally recognized standards.

One of the author of this paper is an alumnus of ENAM and has experienced some challenges during the training. A recent Prosthetics and Orthotic impact assessment in West Africa reported the service provision and personal credentials in Benin and Togo [6]. To our knowledge there are no published data regarding the challenges the students face during training in this sub-Saharan Africa francophone country. Current study in Ghana highlighted some challenges in P and O education [15]. To understand the issue in the regional level, a survey is then necessary especially in one of the francophone accredited P and O education programme institution. This study will present the professionals trained at ENAM and current students' perceptions on the P and O education.

While not all the low-income countries are the same, an in-depth look at this one Francophone country may provide some clues that may be useful to others.

The purpose of this study is to explore the areas in which the P and O education could be improved in order to develop a sustainable P and O education reform and research development in the sub-Saharan African region.

Methods

An invitation to participate in the survey was sent to the head of P and O programme at ENAM, members of Togo Association of Prosthetist and Orthotist and other alumni working in other African countries via electronic mail in April 2017. The invitation requested the participant to link to a specified Google form and complete the survey. The content of the survey was a translated French version of survey of two (one questionnaire for the professionals and other for the students in P and O department) questionnaires used in a former study [15]. The questionnaires were sent to the professionals network group consists of thirty members and twenty eight current students at ENAM Lomé. Completed surveys were sent from the web-server directly to the investigator's electronic mail in a period of two weeks' time for data analysis with no personal identifiers. The purpose of the study was stated in the survey and the participants were free to answer the questionnaire. The study was approved by the Niigata University of Health and Welfare research committee. The surveys were analyzed using the descriptive statistics.

Results

Out of twenty-eight questionnaires mailed to current students, nineteen responses were obtained with male predominance (84.2%) with diverse nationalities from the neighboring francophone countries. This represents a 67.8% response rate. The respondents' characteristics are shown in Table 1. While some (47.4%) of the students wanted to work in P and O industries after their Diploma course, most of the respondents (52.6%) have a desire to continue to graduate level after graduation. In addition, only one of the students reported belonging to a professional organization. Furthermore, lack of access to biomechanics devices (89.5%) and need of its improvement were reported (52.6%).

		Number (n = 19)	%
Sex	Male	16	84.2%
	Female	3	15.8%
Age (years)	Mean	26	
Grade	2nd year	11	57.9%
	3rd year	8	42.1%
Nationalities	Togo	9	47.4%
	*Other	10	52.6%
Plan after graduation	Work in P and O industry	9	47.4%
	Continue to Master Course	10	52.6%
Participation in conferences in P and O	None	3	15.8%
	Once	16	84.2%
Member of professional organization	Yes	1	5.3%
	No	18	94.7%
Access to biomechanics devices	Yes	2	10.5%
	No	17	89.5%
Areas to be improved	Prosthetics	5	26.3%
	Orthotics	4	21.1%
	Biomechanics	10	52.6%

Table 1: *Demographic data and status of students.*

**Countries include Burkina Faso, Cameroon, Central African Republic, Congo and Mali*

Twelve alumni of ENAM including those working in the P and O centres in Togo and neighboring African francophone countries and ENAM responded to the survey. This represents a 40% response rate. The respondents were male predominance n = 11 (91.7%) and the vast majority have less than 10 years (58.4%) working experience (Table 2).

		Number (n = 12)	%
Sex	Male	11	91.7%
	Female	1	8.3%
Age (years)	< 30	2	16.7%
	30 - 40	5	41.7%
	40 - 49	4	33.3%
	> 50	1	8.3%
Nationalities	Togo	8	66.7%
	*Other	4	33.3%
Educational background	Master degree and above	-	
	Bachelor degree	2	16.7%
	ISPO I (University Level)	1	8.3%
	ISPO II (Diploma course)	9	75%
	ISPO III (Technician)	-	
	Short Course in P and O		
	Yes	2	16.7
	No	10	83.3%
	Further training	2	16.7%
	Silicone technology		
	Yes	1	8.3%
	No	11	91.7%
	Participation in conferences in P and O		
	Yes	8	66.7%
	No	4	33.3%
	Member of professional organization		
	Yes	10	83.3%
	No	2	16.7%
Years of practice	< 5	4	33.3%
	5 - 10	7	58.4%
	10 - 15	-	
	15 - 20	-	
	> 20	1	8.3%

Table 2: *Alumni respondents' profile considering educational background, nationalities and year of practice.*

**Countries include Cameroon, Democratic Republic of Congo, Mali and Rwanda*

In terms of credentials, three quarters (75%) of all respondents were certified with ISPO category II with diverse nationalities from the sub-Saharan Africa francophone countries. A vast majority (83.3%) of the respondents never had a further training related to P and O after their first Diploma. Moreover, none of the respondents earned Master degree and above. In addition, the vast majority (91.7%) of the respondents reported the lack of silicone prostheses manufacturing technology. The major challenges outlined by the respondents were mainly related to lack of research equipment and facilities, lack of continued education and lack of applied biomechanics (Table 3).

Challenges
Lack of research equipment and facilities in P and O
Lack of continued education
Lack of research funds
Lack of biomechanics tools and motion analysis systems
Lack of experienced professionals
Lack of innovation in the P and O field

Table 3: *Major challenges generated from the survey.*

Discussion

The education and the provision of P and O service have become increasingly important in developed and developing countries worldwide [1]. Given the substantial investment in the training of future P and O technicians, researchers and the potential impact of quality of life of the P and O devices users, it is important to understand the perceptions of professionals and trainees towards sustainable development.

This qualitative study highlights the challenges the P and O education faces in one of the first francophone African country accredited by ISPO (Table 3). Togo has approximately 8 centers operating in P and O services. Among these centers, 5 were government owned and others by Non-Government Organizations. Thus, employment for local graduates students remain a challenge. Some have to seek employments in the neighboring African countries. In order to integrate new local graduates into the professional workforce, a yearly basis recruitment form the government is necessary. Also, intervention of private P and O industries in the country is required. It can be inferred from past studies that ENAM train more students from other African countries than Togolese students [6]. Current students who are to graduate at ENAM in July 2017 are in total eight students. In contrast, Niigata University of Health and Welfare (NUHW) in Japan graduate in average 40 students yearly to meet the current global issue of P and O and assistive technology professionals.

The challenges highlighted in this study were not exclusive to other related healthcare in Togo. Previous researches in immunization [7] have also reported various challenges related to lack of experienced health care providers, unavailability of equipment and underexploitation of research results. In order to bring the healthcare to a standard level, the constant support from the national government is essential.

The findings are not exclusive to this particular country in the sub-Saharan African concerning P and O education and research. Similar studies conducted in Ghana, Malawi and Tanzania [15-17] also reported needs for expertise, experience and scientific approach to establish a quality education in P and O. Mainly focusing in the applied biomechanics course is highly recommended. In addition, student graduation project work has to be more generalized in the field. The project should not only be limited in P and O device manufacturing but also should include other assistive technology development. Due to unavailability of graduate programme in the existing universities in the country, some of the alumni of ENAM who studied ISPO category I or Master degree in countries other than French speaking had to face language barriers in English, Dutch or even Japanese.

Solutions suggested in view of challenges in P and O in Togo

As suggested in previous study [16,18], in order to develop the educational system and quality service in the region, a strategic plan is then necessary. For instance, incorporation into the curriculum the notion of universal design and silicone prosthesis manufacturing technology. Introduction of Assistive products consultant, assistive products planner and housing environment coordinator for elderly and disabled people (case of curriculum of NUHW in Japan) [19]. Diversity of career path for the young graduates. Because the Togo national students are limited in choosing P and O industries. It will be better to train also those capable of working in a wide environment of assistive technology. For example, the graduation project work done in one of P and O programme in Japan reflects a variety of topics in the field [20]. Constant training of P and O students and yearly admission of new students into the programme. Create virtual learning library portal for students. Collaborate with other University in the developed countries. Establish the exchange programme among institution that have research facilities. Elaborate seminars for students from their first year. Introduce more specialized courses in the current curriculum such: human wear shoes, applied biomechanics. Establishment of national journal related to P and O education and service in the country. Developed countries like Japan has lots of publications in P and O journals such: Japan Academy of Prosthetics and Orthotics, Japan Society of Prosthetics Orthotics and other rehabilitation medicine journals. Moreover, these associations and societies organize annual conferences and numerous seminars during the year across Japan to upgrade the skills of the P and O professionals. Educational webinars from international medical professional in applied biomechanics. Engage visiting faculty members from reputable universities in P and O programme. Integrate academic writing staff into the existing training programme. Subscription of P and O academic membership for students in order to broaden their knowledge in the trending of P and O services and research. Developed country like Japan has P and O academic membership for students from their first year [11]. Fostering research and development of local materials. Develop specialty centres to train local staff. Search for strategies to improve teaching quality for ISPO category I and Master Degree programme because graduates who desired to upgrade their skills have to face language barriers before getting admission into graduate course either in English or other language. Using simple motion analysis devices for applied biomechanics course such as: foot switch, 2D camera, webcam, low-cost optical 3D motion analysis system [21-24]. Establishment of new state-of-the-art P and O research centres and institution in order to avoid brain drain that could be a significant resource in educating the next generation of P and O professionals. Establishment of new P and O schools in the other African francophone countries such the Democratic Republic of Congo, Central African Republic, Cameroon, Mali and others in order to facilitate the training across Africa. The content of the prosthetics and orthotics program in the sub-Saharan Africa countries need to be improved. As stated by the WHO, the education of the healthcare providers should include the following: research and technology, needs of a country and professional environment [25].

The questionnaire was distributed through internet and some technicians in the rural might not have access to internet to complete the form before the deadline. Therefore, an investigation of the clinical practice in rural area of the country is necessary. Pre-prosthetic rehabilitation service in the rural area needed to be investigated for better service. The respondents were, however, of diverse nationalities throughout the sub-Saharan African francophone countries. In fact, the demographic make-up, including the predominance of male respondents, reflects the lack of female gender in the P and O field in the region. Therefore, the conditions limiting the gender equity in the P and O field need to be investigated.

Some recommendations and future perspectives are suggested:

- Development of simple motion analysis device for applied biomechanics course
- Sport leisure activities implications for people with disability
- Investigation of accessibility of public buildings with assistive technology device
- Key conditions associated with limbs deficiencies needed to be explored
- Long term follow up of the alumni outside of the country can contribute to potential gain in academic reform in the future.
- Recycling and managements methods of the P and O materials need to be developed. Especially the thermoplastic molding technique and the plaster of Paris.

Conclusion

The study was the first attempt to highlight the challenges in P and O education in this low income francophone country in West Africa. The findings report major challenges particularly the need of continuing education, the establishment of research centres and the development of applied biomechanics in the existing facilities. Suggested further investigations in the remote centres located in the rural regions. Promote and foster research in the P and O field. Allocate research funds for the existing faculties. In addition, major, key conditions associated with disability in the country needed to be investigated. The results of this survey can be a key element for further research in other francophone countries for better education and service in the rehabilitation field.

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