

# Implementing a Two-Tiered Model of Optometry Training in Mozambique as an Eye Health Development Strategy

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## Abstract

**Background:** The global burden of vision impairment has been acknowledged by the World Health Organisation as a public health challenge. In order to scale up the production of eye health personnel in developing countries, a tiered model of optometry training was explored in Mozambique.

**Objectives:** The Mozambique case study was evaluated to assess the feasibility of a tiered model of optometry training as a developmental eye health strategy.

**Methods:** A qualitative, case study approach was used. Semi-structured key informant interviews were conducted and project documents were reviewed in the data collection phase. Data underwent a process of content analysis, using a constant comparative approach across sources, and was analysed thematically using inductive reasoning.

**Results:** Three key themes which emerged were Rationale for a training model, Implementation considerations and Development practice considerations. Results demonstrated that while tiered models of training may have developmental rationale, awareness of the profession and its place in addressing health needs, intensive consultation with local stakeholders and a thorough situational analysis are required for this strategy to be feasible.

**Conclusions:** A tiered model of training appears to have theoretical basis as a developmental eye health strategy. However, local applicability and legislative alignment is required in order for these training initiatives to be sustainably implemented.

**Keywords:** eye health development Mozambique, optometry training model

## 1. Introduction

The global burden of blindness and vision impairment has been acknowledged by the World Health Organisation as a priority public health challenge (WHO, 2010). In 2015, an estimated 36 million people globally were blind and 405 million had some degree of vision impairment (Bourne et al., 2017). Studies have demonstrated the large-scale economic impact of blindness and vision impairment for nations (Fricke, Holden, Wilson, Schlenker, Naidoo, Resnikoff, & Frick, 2012), with significant associated productivity loss (Smith, Frick, Holden, Fricke, R., & Naidoo, 2009). Uncorrected refractive error, as a priority public health challenge, is therefore an important consideration for developing countries who seek to improve their economic statuses. Developing countries, however, experience a myriad of challenges which directly impacts the health and education segments of their economies (Robertson, Del Dehart, Tolle, & Heckerman, 2009). These include limited or poorly trained human resources, a lack of infrastructure and limited funding to drive programmes (Robertson et al., 2009), with Africa being one of the regions most affected by vision impairment (Bourne et al., 2017) and lack of human resources for eye health (Minto, 2008). In general, most countries in Africa are also under-resourced in terms of the capacity of the health system to meet the needs of their population.

Human resources for eye health pose a significant challenge for Africa. Optometrists are primary health care practitioners who provide comprehensive vision care, diagnosis and management of diseases affecting the eye

(World Council of Optometry, 2005) yet the majority of countries in Africa still having no national optometry training programmes (Minto, 2008). This has led to innovative human resource capacity development solutions by various stakeholders in eye health (Minto, 2008). Previous non-governmental organisation (NGO)-led interventions included upskilling existing mid-level health personnel such as nurses in refraction skills to meet the need. However, these interventions were not sustainable (Zhao et al., 2013). Stakeholder efforts therefore shifted to the development of institutionalised programmes for training professional optometrists in the last 2000s (Minto, 2008).

Many African countries are now investing in medical education to address health workforce shortages and improve the health of their population (Kiguli-Malwadde et al., 2015). Public health efforts to reduce health disparities have included establishing training programmes in developing nations through global health partnerships (Pinder, 2019). However, establishing health professional training programmes in low income countries pose several challenges including inefficient utilisation of donor funding, inadequate scale up, insufficient emphasis on the acquisition of practical skills and poor alignment with local priorities (Cancedda, 2015). In 2009, optometry training was introduced to Mozambique through a donor-funded project.

Optometry training varies across the world (World Council of Optometry, 2015). Historically, the optometry profession mainly provided refractive services and spectacles. However, it has now evolved to a primary health care profession providing diagnosis and treatment for a wide range of vision and related health conditions affecting the eye. Optometry education has also progressed from one and two year post-secondary education to a minimum of four years of college/university education in many countries (World Council of Optometry, 2015).

Mozambique is one of the least developed countries in Africa, and one of the poorest countries in the world (United Nations Development Programme, 2014), with the worst performing sector being education (Pinder, 2019). Following decades of civil war, more than 60% of Mozambique's population are still reportedly living in severe poverty (Pinder, 2019) and the infrastructure capacity of the health system to deliver health services remains vastly inadequate. In Mozambique, optometry as a profession did not exist prior to this development intervention. As a consequence, access to eye health services has been severely limited (World Council of Optometry, 2015). At the time of this research, human resources for eye health data indicated that in 2014, there were still just 25 ophthalmologists in Mozambique (8 Mozambican and 17 expatriate), 134 ophthalmic technicians and 12 opticians (Mozambique Eye Health Advocacy Group, 2014) for an estimated population of 27 million (World Bank, 2014). The need for a trained health workforce to meet the eye health needs of Mozambicans as a priority public health problem was therefore evident.

Various models of training optometry personnel have been implemented in response to the human resources for eye health challenge and the need to scale up production of eye health personnel in severely under-resourced countries. One such example was a tiered 'Multiple Entry and Exit' model (Naidoo, 2000) proposed for this first ever optometry training programme in Mozambique. The intervention formed part of a development funded project, initiated through a partnership between higher education institutes in Ireland, a leading eye health development organisation in South Africa, and a new university in the north of Mozambique in 2009 as part of Irish Aid's Programme of Strategic Cooperation between Higher Education Institutes and Research Organisations (Wallace, 2016). This tiered model of training was different to conventional models of training in optometry which are typically single entry and exit of four years in duration, leading to a Bachelor of Optometry degree. This new model proposed two entry and exit points within the traditional four year structure, with the intended purpose of scaling up the production of graduates who could provide refractive services at both basic level (Optometric Technicians) and diagnostic skills levels (Optometrists), so addressing the comprehensive eye health needs within the Mozambican health system. The two year exit fostered more early entry into the health system for roll-out of basic eye care services across the country. However, the feasibility of this model had never been tested. This research therefore undertook to evaluate the experiences of the Mozambique project, in order to assess the feasibility of a tiered model of training in optometry as a developmental eye health strategy. The results of the research showed that in order for novel models of training to succeed, consideration must be given to the local regulatory context, feasibility of the proposed initiative and stakeholder sentiment.

## 2. Methods

This case study (Yin, 2006) sought to explore the feasibility of a two-tiered model of training in optometry, being implemented at a university in Mozambique as part of a developmental eye health strategy. A qualitative approach was employed as this was a proposed new concept for scaling up the production of optometric personnel in Africa and other developing countries (Wallace, 2016).

The research was framed within an interpretive paradigm (Van Manen, 1984). Data was collected by means of

semi-structured interviews and document review. Participants in Mozambique, Ireland, Canada and South Africa, who were associated with the project between 2012 and 2014, were interviewed. This purposive sample included development partner representatives, project managers, project administrators, university officials and optometry faculty, as well as programme coordinators in Mozambique who were involved either in the design, planning or implementation of the project.

Of the 22 people identified as key informants, 18 agreed to participate in the study. Informed consent was obtained, and in-person interviews were conducted by use of a semi-structured guide consisting of open-ended probe questions. This facilitated insight into the perceptions and experiences of the participants in relation to implementation of the proposed model of training. Interview responses were transcribed, and raw data was coded to protect the participant's identity. Each participant was interviewed in English, with interviews lasting an average of 75 minutes. Van Manen's pedagogy of interpretive phenomenology using the selective approach was applied to derive themes (Van Manen, 1984). Analysis began with familiarisation of the content, pattern recognition and open coding of transcripts. Individual meaning units were coded into categories through an interpretive process. Data was analysed thematically using inductive reasoning.

Documents reviewed included the project's funding proposal, memorandum of understanding, project reports and minutes of partner meetings. These were sourced, on request, from project partners, and underwent a process of content analysis, using a constant, comparative approach across sources.

### 3. Results

Participants included representatives from all partner organisations in Mozambique, Ireland and South Africa, as well as project staff or affiliates, with the majority being non-Mozambicans (Figure 1).

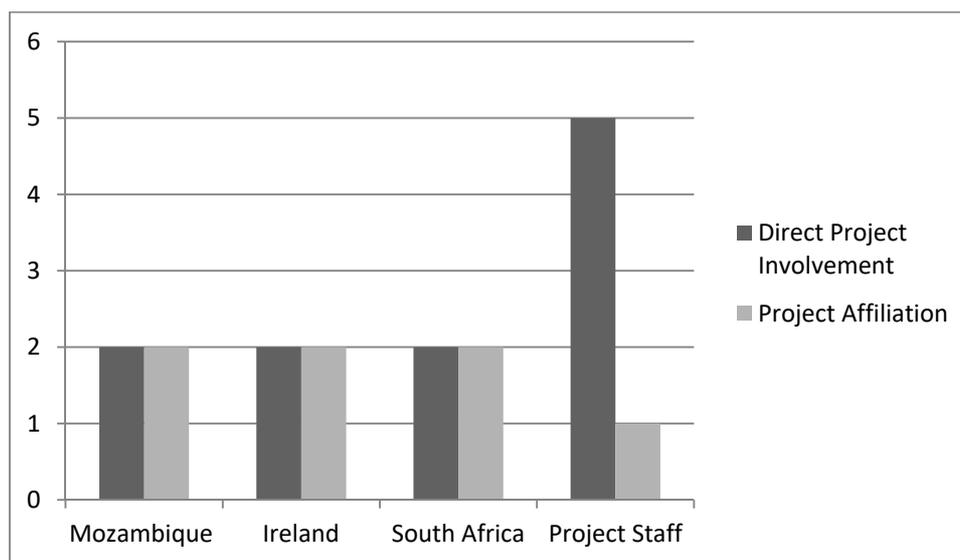


Figure 1. Participant distribution: Country partner representatives and project staff

Three themes and related sub-themes emerged from the analysis and are reflected in Table 1.

Table 1. Themes and sub-themes

Theme	Sub-themes	Quotes
<b>Rationale for the model</b>	Development imperatives	<i>“There was a clear intent on developing schools of optometry that trained graduates for the public sector, unlike the predominant ethos of schools in the West that primarily trained optometrists for the private sector.”</i>
	Massification	<i>“There was good thought to the model, but not enough time to work out the details.”</i>
<b>Implementation Challenges</b>	Local context	<i>“For a new programme, one should spend time looking at other models of training versus the reality in Mozambique. There was merely an extrapolation of what goes on in Africa and the perceived need.”</i>
	Legislative alignment	<i>“The university is governed by law. It cannot give less than graduate courses.”</i>
<b>Development Practice Considerations</b>	Collaborative planning	<i>“Curriculum development: I felt that this aspect did not work out nicely initially. It was not conducive to the university’s plans. We had some pressure from the project to reduce the training time (2 year graduates), but had to fight hard. The project should not determine how the local programme is carried out. It must be according to the law. So the university pushed for 4years”</i>
	Stakeholder engagement	<i>“Training and government priorities around human resources need to coincide. Therefore, government support of the process is important. The issue of bringing the Ministry of Health closer to the project was not key in the beginning but became more important as the project grew”</i>
	Global alignment	<i>“We must do things with a long-term view and not a “Band-aid approach”. Just because Mozambique is a poor country, does not mean it will support a short term needs approach. The programme should be aligned with other courses in the world to make it easier in terms of mobility.”</i>

The first theme, *Rationale for the Model*, includes the sub-themes development imperatives and massification. The concept of a tiered model of training in optometry appears to have been driven by the advocacy imperatives around addressing the human resources for eye health gaps affecting predominantly low income countries. Given the identified global burden of blindness and visual impairment, there was a need for countries to work towards VISION 2020: The Right to Sight’s challenge of eliminating all causes of avoidable blindness in the world by the year 2020. This was a joint programme of the World Health Organization and the International Agency for the Prevention of Blindness. The tiered model was also based on the principle of massification. Massification is an exponential scaling up strategy intended to reach the goal of producing a large number of graduates in a shorter duration of time than would be possible in a traditional single entry / exit programme structure. The model would support graduation of a mid-level, two-year trained optometric technician intended to provide eye health services at community level within a district-based public health system. Some candidates would however enter year one on the continuous degree tract, while diploma graduates could potentially re-enter the training programme in year three, at a later stage, to complete the four year qualification in optometry. This model formed the basis of this research, and is represented below (Figure 2).

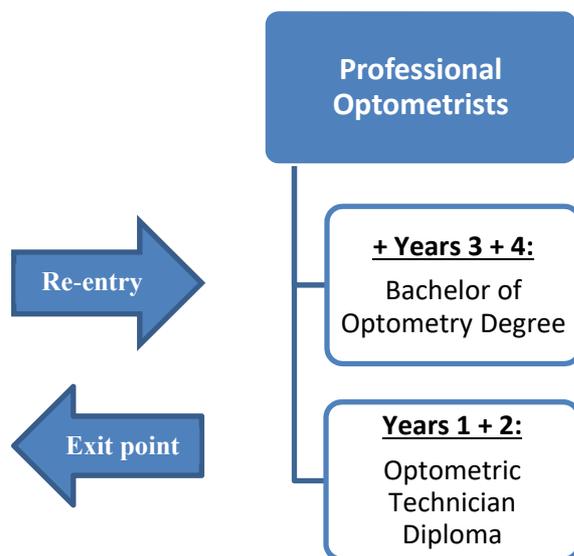


Figure 2. Multiple Entry and Exit model of training in Optometry

The massification strategy mirrored a funnel approach, intended to produce a larger numbers of graduates at the lower level who could serve the eye health needs of public sector-dependent communities, particularly in outlying rural areas. However, the project failed to recruit large numbers into the programme initially, due to a lack of awareness about the profession of optometry and capacity constraints within the host institution. Several logistical challenges were encountered in an attempt at implementing the tiered model.

The second theme *Implementation Challenges*, included the sub-themes local context and legislative alignment. A situational analysis was not conducted in Mozambique prior to commencement of the project. This was attributed to the time-restricted nature of the grant, and meant that external partners did not have a full contextual understanding of the specific developmental challenges and educational landscape within which the project would be implemented when designing the training model. Furthermore, at the time of implementation of the project, an existing category of mid-level eye health workers were actively functioning within the public health system in Mozambique. They were known as ophthalmic technicians, who functioned within a similar capacity to the proposed optometric technicians. However, the training for ophthalmic technicians was significantly shorter than that of optometric technicians and did not address the full scope of the proposed two year-trained optometric technicians. The long-standing existence of this cadre was however seen locally as meeting the need for mid-level eye health personnel in the country. At the time of this project's implementation, an up-skilling programme for the existing ophthalmic technicians who had been trained in Cuba many years prior was also being conducted by another development agency. This training was aimed at enhancing the skills levels of ophthalmic technicians and reinforcing primary competencies. Therefore, there was little support for the development of the new proposed optometric technician cadre, or an additional mid-level eye health training programme in Mozambique.

Higher education legislation was amended in Mozambique soon after the launch of the project, which had direct implications for the proposed model. This legislative change meant that diploma programmes could no longer be offered at universities. The minimum duration of training for profession-linked qualifications was also set at three years. Therefore the tiered model, as intended, could not be implemented within the partnered university institution as a continuous, embedded training programme. Efforts by the project to secure another institution to host the optometric technician programme were also unsuccessful, as there were concerns around linking the two programmes and levels of qualifications delivered by separate institutions. There was also little institutional will on the part of prospective institutions to embrace this initiative. The project therefore eventually abandoned the planned tiered model and conceded to the single exit Bachelor in Optometry programme similar to those offered in South Africa and Ireland.

The third theme, *Development Practice Considerations*, included the sub-themes collaborative planning, stakeholder engagement and global alignment. There was resistance from local partners to the tiered model of training, partly based on the perception that external partners were trying to impose a prescribed model that was inappropriate for Mozambique's educational and developmental needs. Local participants felt that they were not consulted on the design of the model, which was not in keeping with developments in optometry training globally.

This pre-designed curriculum and programme structure, proposed as a generic human resource solution to meeting developing country eye health needs, therefore faced much resistance locally. Documentary evidence suggested that there was a lack of collaborative planning within the project. However this was disputed by the external partners. Local preference was that new training programmes should be universally acceptable and aligned with accepted models of training in other parts of the world.

The Ministries of Health and Education in Mozambique were not adequately consulted prior to the design and implementation of the project. This lack of continuous engagement and advocacy with these key stakeholder Ministries posed a risk to the project achieving its objective of public sector-employed optometrists. Moreover, the Ministry of Health was the expected employer of graduates, but due to delayed engagement with them, posts for optometrists had not been created within the public health sector at the time of graduation of the first cohort. It was later acknowledged government support of such processes is important.

#### 4. Discussion

This research set out to evaluate the feasibility of a tiered model of training in optometry as a developmental eye health strategy, which was a novel concept. The initiative supported global advocacy-led imperatives (International Agency for the Prevention of Blindness, 2018) to address Africa's eye health needs. While a massification strategy represented a valid development approach the model failed to be successfully implemented in Mozambique. Elsewhere in the world, optometry training programmes average four years in duration resulting in a Bachelor's degree in optometry (Padilla & di Stefano, 2009). While developing mid-level training programmes may produce short term gains in addressing eye health service delivery gaps for affected countries, there remain questions about the long term viability of such programmes (Zhao et al., 2013). Tiered training models therefore appear valuable in theory, but are difficult to implement in reality.

A similar, tiered model of training was implemented in Malawi in 2008. The Malawi experience demonstrated that there were inherent structural problems in the tiered model of training, where all of the students in the diploma programme had aspirations to upscale their qualifications to degree level and were reportedly merely using the diploma programme as an entry into the Bachelor of Optometry programme (Moodley, 2015). This is in keeping with sentiments of global parity expressed in this research, and suggests that individual careers of candidates at this mid-level cadre will be short-lived, with trainees being lost to community service once these prospective candidates gained entry into the degree programme. Furthermore, not all of the diploma graduates met the entrance requirements for the degree programme, based on differing entrance criteria for the respective programmes at the two separate institutions. Additionally, the degree programme could only accommodate a small number of entrants into the third year re-entry point given the existing students in the full-stream degree programme. Direct entry into the degree programme would also not be automatically possible, and would require a bridging programme to prepare graduates for further study towards qualification as a full optometrist. This would place an additional resource burden on development project funders. These findings are in keeping with challenges experiences in Central America when implementing a three-tiered training programme for field epidemiology (Traicoff et al, 2015).

The unrealised development of a new mid-level eye health worker in the form of optometric technicians in Mozambique was not surprising, since a similar mid-level eye health worker had already existed in the country, and duplication in the context of scarce resources is not justified. Maximising available resources requires less investment, both in terms of advocacy and training costs, and is less likely to be impacted by changes in legislation, or local resistance, as was the case in this project. Development organisations should therefore consider the local landscape and how available human resources could be used to achieve desired developmental objectives. The intended massification strategy initially advocated by this project proved not feasible within the local context.

Situational analysis is an analysis of factors in the planned project context to assess their potential impact on the project (Richards, 2001). The finding that a comprehensive situational analysis had not been conducted prior to the design and implementation of the proposed model is linked to the discontinuation of the tiered model of optometry training in Mozambique. Post-conflict countries often engage in legislative reform to bring about desired change (Samuels, 2006). An understanding of legislative and policy frameworks, and the implications thereof on proposed models of training is therefore imperative when proposing new training models. These must be compatible with local legislation and educational frameworks (Wallace, 2016), giving consideration to global parity as a longer term developmental goal. Development projects should therefore factor this crucial analysis phase into grant planning schedules, as the success and sustainability of development interventions is dependent on local applicability and acceptability of proposed interventions.

The sentiments of local partners to proposed approaches is also important (Moodley, 2015). Findings that the

aspirations of officials in Mozambique were biased towards global parity of local training programmes, with the mixed results regarding levels of consultation on the proposed training model, points to the fine line between consultation and consent. Vermeulen and Cotula noted that while consultation offers a voice for affected people within the development process, it does not confer any authority to veto or shape the terms of the investment, falling short of consent (Vermeulen & Cotula, 2010). These ‘consultation’ processes are therefore often unsatisfactory, particularly in light of the power relations between the North-South development partners and funding agencies (Shembe, 2015). Research has also shown that there is the risk that potential beneficiaries of development interventions may withhold key information for fear of losing the funding (Busiinge, 2010). Local partners should therefore be involved in designing solutions to their development challenges, in order to effect buy-in, cost-effectiveness of solutions and ease of implementation. External partners should also avoid pre-designed solutions based on theoretical assumptions, which may be perceived as imposing by developing country partners (Shembe, 2015).

## 5. Conclusion

The Mozambique experience demonstrated that a tiered model of training in optometry as an eye health development strategy has theoretical merit, but is challenging to implement in the absence of a full contextual understanding. A comprehensive situational analysis must be conducted prior to designing an intervention and must be factored into the project’s implementation plan. More specifically, locally available resources must be considered first, prior to proposing a new category of health worker which requires extensive investment to establish. Education legislation and other potential logistical challenges must also be assessed in order to support the feasibility of tiered training models in-country. Consideration for the country’s broader development aspirations towards global parity should also be central to these assessments, to support sustainability of development investments. Relevant government ministries must be engaged from the proposal phase, particularly if the public sector is the targeted employer of graduates for professions which have not previously existed in a country. Stakeholder consultation at every stage of these development interventions is integral to solutions that will be locally owned, can be efficiently implemented and will be sustainable. The feasibility of a tiered model of training in optometry as a developmental eye health strategy is therefore contingent on intensive collaborative planning, giving consideration to the local voice and country’s developmental aspirations in order to ensure local applicability, acceptability and sustainability of development interventions.

## Competing Interests Statement

The authors declare that there are no competing or potential conflicts of interest.

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