

## Continuous professional training of medical laboratory scientists in Benin City, Nigeria

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**Background.** Training and re-training of healthcare workers is pivotal to improved service delivery.

**Objective.** To determine the proportion of practising medical laboratory scientists with in-service training in Benin City, Nigeria and areas covered by these programmes.

**Methods.** Medical laboratory scientists from Benin City ( $N=127$ ) (public ( $n=79$ ) and private ( $n=48$ ) sectors) were recruited for this study. A detailed questionnaire was used to obtain relevant information from all enlisted participants.

**Results.** Eighty-four (66.1%) of all medical laboratory scientist volunteers ( $N=127$ ) reported to have attended an in-service training programme. This was significantly associated with gender (male v. female: 80.9% v. 58.8%; odds ratio (OR) 6.071; 95% confidence interval (CI) 2.510 - 14.685;  $p<0.0001$ ). Only 9/84 (10.7%) participants reported to have had at least one in-service training session during the last 12 months. Attendance was significantly affected by qualification ( $p=0.029$ ), area of specialisation ( $p=0.003$ ) and affiliation ( $p=0.005$ ). Irrespective of affiliation, self-sponsorship of in-service training programmes was most frequently reported by study participants. Training received by respondents was mainly in instrumentation and diagnostic techniques.

**Conclusion.** Attendance of in-service training programmes during the last 12 months was poor. Training programmes were mostly funded by participants. Regular training of medical laboratory scientists by the relevant authorities and agencies is advocated.

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Against the backdrop of current emerging and re-emerging diseases, there is a need for accurate and prompt clinical and laboratory diagnosis. The recognition of new infectious agents, the global emergence of antimicrobial resistance and the potential for acts of bioterrorism stress the need for the continuous improvement of laboratory personnel's knowledge.

Laboratory medicine is pivotal to the effective management of disease, playing a role in 60 - 70% of decisions related to hospital admission, prescribed medication and discharge of patients.<sup>[1]</sup> This dependence on laboratory data places the medical laboratory scientist in a prime position with regard to the management and care of patients.

One of the major challenges for improving healthcare programmes in sub-Saharan Africa is the lack of quality laboratory services, mainly due to the limited availability of well-trained technical and managerial laboratory personnel.<sup>[2]</sup> Critical to achieving the United Nations Millennium Development Goals is the improvement of healthcare workers' performance.<sup>[3]</sup> Continued professional development is generally understood to be crucial for the development and improvement of the quality of healthcare delivery services.<sup>[4]</sup> Training of healthcare workers is an important motivating factor, and is also associated with improved performance of clinical procedures.<sup>[5,6]</sup> In-service training is important for better performance and could either employ an on-site or off-site training module.<sup>[7]</sup> It is recognised as a key means by which staff are provided with the necessary knowledge and skill to improve overall institutional performance and achieve the objectives of the organisation.<sup>[8]</sup> In-service

training is expected to be conducted regularly and to involve different categories of workers of an organisation so that their skills contribute to the attainment of the organisational goals or objectives.<sup>[8]</sup> Although management experts and the Nigerian government have identified the importance of training and development in various white papers, these goals of the public service have mostly not been achieved.<sup>[9]</sup> Findings from a Nigerian study involving healthcare workers in nine public primary healthcare centres in a local government area showed that none of them had received in-service training during the 2 years before the study.<sup>[10]</sup> The situation is unlikely to be any different in the private sector in Nigeria.

While medical laboratory scientists in Nigeria play an important role in qualitative healthcare delivery, little is known about the extent, type and focus areas of their in-service training. The present study aimed to determine the proportion of medical laboratory scientists with in-service training in Benin City, Nigeria, and in the areas covered by such training programmes.

### Methods

#### Study population

Practising medical laboratory scientists ( $N=127$ ) (42 males and 85 females) were recruited for this study. Seventy-nine participants were from the public sector and the remaining 48 from the private sector, all of them having >1 year post-qualification work experience. A detailed questionnaire (Appendix 1) was used to obtain relevant information from study participants. In-service training included all on- and off-site training received. Informed consent was obtained from all participants prior to completion of the questionnaire.

Study approval was obtained from the Edo State Ministry of Health, Benin City, Nigeria.

## Statistical analysis

Data were analysed using the chi-squared and odds ratio (OR) tests Graphpad INSTAT. Statistical significance was set at  $p < 0.05$ .

## Results

A total of 84/127 (66.1%) medical laboratory scientists reported to have attended an in-service training programme. Attendance was significantly associated with gender (male v. female: 80.9% v. 58.8%; OR 6.071; 95%

confidence interval (CI) 2.510 - 14.685;  $p < 0.0001$ ). Only 9/84 (10.7%) participants with training reported to have had attended at least one training programme during the 12 months before the study (Table 1).

Participants working in public institutions and those with PhD degrees were significantly more likely ( $p = 0.005$  and  $p = 0.029$ , respectively) to have undergone continuous professional training activities. With regard to area of specialisation, medical microbiologists were significantly more likely ( $p = 0.003$ ) to have been engaged in in-service training (Table 2).

Self-sponsorship of in-service training programmes was the most prevalent among respondents (Table 3). Training was largely in the area of instrumentation and diagnostic techniques (Table 4).

**Table 1. Medical laboratory scientists with in-service training**

Characteristics	Participants, <i>n</i>	With training, <i>n</i> (%)	OR	95% CI	<i>p</i> -value
<b>Ever received training</b>					
Male	42	34 (80.9)	6.071	2.510 - 14.685	<0.0001
Female	85	50 (58.8)	0.165	0.068 - 0.398	
<b>Received training in last 12 months</b>					
Male	34	3 (2.9)	0.709	0.165 - 3.057	0.733
Female	50	6 (12.0)	1.409	0.327 - 6.070	

OR = odds ratio; CI = confidence interval.

**Table 2. In-service training of medical laboratory scientists with regard to qualification, specialisation and affiliation**

Characteristics	Participants, <i>n</i>	With training, <i>n</i> (%)	OR	95% CI	<i>p</i> -value
<b>Highest qualification</b>					
AIMLS	57	42 (73.6)	6.071		0.029
BMLS	42	21 (50.0)	0.165		
MSc	23	16 (69.5)			
PhD	5	5 (100.0)			
<b>Area of specialisation</b>					
Medical microbiology	62	49 (79.0)	0.709		0.003
Chemical pathology	39	17 (45.9)	1.409		
Haematology	22	16 (72.7)			
Histopathology	4	2 (50.0)			
<b>Affiliation</b>					
Public institutions	79	60 (75.9)	3.158	1.468 - 6.792	0.005
Private institutions	48	24 (50.0)	0.317	0.147 - 0.681	

OR = odds ratio; CI = confidence interval; AIMLS = Associate of the Institute of Medical Laboratory Science; BMLS = Bachelor of Medical Laboratory Science; MSc = Master of Science; PhD = Doctor of Philosophy.

**Table 3. Sponsorship of training programme with regard to affiliation of medical laboratory scientists**

Characteristics	Participants with training, <i>n</i>	Training		
		Employer, <i>n</i> (%)	Self, <i>n</i> (%)	NGO, <i>n</i> (%)
<b>Affiliation</b>				
Public institutions	60	12 (20.0)	48 (80.0)	13 (21.7)
Private institutions	24	1 (4.2)	22 (92.7)	2 (8.3)
Total	84	13 (15.5)	70 (83.3)	15 (17.9)

NGO = non-governmental organisation.

**Table 4. Specific areas of training received by medical laboratory scientists**

Variables	Participants with training, n (%)
<b>Training areas received</b>	
Instrumentation and diagnostic techniques	34 (40.5)
Laboratory biosafety	13 (15.5)
Internet and computer technology	12 (14.3)
Prevention of hospital-acquired infection	17 (20.2)
Quality assurance	3 (3.6)

## Discussion

A major challenge in improving healthcare programmes in sub-Saharan Africa is the lack of quality laboratory services. This is mainly due to the limited availability of well-trained technical and managerial laboratory personnel.<sup>[2]</sup> The human resources crisis in the healthcare sector in low- and middle-income countries is currently receiving increased global attention.<sup>[3]</sup> To the authors' knowledge, this is the first study to assess continuous professional training received by practising medical laboratory scientists working in the public and private sectors in Nigeria.

Irrespective of area of specialisation, 84 (66.1%) of all medical laboratory scientists participating in this study reported to have received in-service training. However, only 9 (10.7%) participants with such training had attended a course during the 12 months before the study. This is less than the 94.7% reported in a Malawian study among a group of healthcare workers comprising nurses, medical assistants, clinical officers, a laboratory technician and a dental therapist.<sup>[4]</sup> In recent years, clinical procedures have undergone tremendous changes in that manual handling of samples has gradually given way to an automated approach in many clinical laboratories. Issues relating to risk assessment, procedures for safe use of recombinant DNA technology and transport of infectious materials have also been updated.<sup>[11]</sup> Although a fair number of respondents (84 (66.1%)) reported to have participated in continuous professional training, the number with such training during the 12 months prior to this survey was poor, which may represent gaps in knowledge of current diagnostic and managerial laboratory techniques. Gender was associated with attendance of in-service training, with male respondents being 3 - 15 times more likely than female respondents to have ever received training. In-service training, depending on whether it employs an on- or off-site training module, can be both expensive and time consuming. Female respondents in this study, apart from their professions, are very likely to be homekeepers and mothers and may therefore, owing to domestic pressures, not readily engage in continuous professional training. However, more females than males had received some form of training in the last 12 months, even though the difference failed to reach statistical significance. This may be related to the current advocacy on women empowerment.

In Nigeria, the first generation of medical laboratory scientists was given the professional qualification AIMLT or AIMLS (Associate of the Institute of Medical Laboratory Technology of Nigeria), which is equivalent to a degree. However, current medical laboratory science graduates from various Nigerian universities are awarded the BMLS (Bachelor of Medical

Laboratory Science). The development of the medical laboratory science profession in Nigeria has closely followed the same pattern as in the UK. Respondents with BMLS degrees in this study were significantly less likely ( $p=0.029$ ) to have been engaged in continuous professional training. Professional development opportunities for health workers in Nigeria are limited.<sup>[12]</sup> Recipients of the BMLS degree (first degree) are unarguably younger professionals, as the awarding of this degree is a recent development in Nigeria. Such respondents are therefore more likely to occupy the lower ranks in laboratories and receive smaller monthly wages. They may therefore not enjoy favourable consideration for selection in training programmes compared with senior colleagues and may also lack the financial ability to undertake such a programme with self-sponsorship. With regard to specialisation, medical microbiologists were significantly more likely ( $p=0.003$ ) to have been involved in in-service training than other laboratory staff. Infectious diseases account for the majority of deaths in sub-Saharan Africa.<sup>[13]</sup> Many local and international intervention agencies have focused on diagnosis, prevention and treatment of these diseases, with frequently organised seminars and workshops for healthcare workers and the general public. This emphasis on infectious disease, which falls within the domain of the medical microbiologist, may be responsible for the observed trend in this study. Respondents working in the public sector were observed to be significantly more likely ( $p=0.005$ ) to have received in-service training than those in the private sector. The public sector is run and funded by the government of Nigeria, which allocates significant annual funds to its operations. Healthcare workers in this sector may therefore enjoy comparatively better funding with regard to workshops and seminars than those in the private sector, which may have accounted for the observations made in this study.

Irrespective of affiliation of respondents, involvement of employers in providing sponsorship for training programmes for medical laboratory scientists was the least observed. Self-sponsorship was the most common form of funding for in-service training events reported. This may again explain the poor attendance of training programmes during the 12 months prior to this survey. Despite the recognition of the importance of training by management experts and government, as expressed in white papers on various reforms in Nigeria, the experience of manpower training and development in the Nigerian public service has been one of more ruse and waste.<sup>[9]</sup> Consequently, many workers in Nigeria, because of limited opportunities for continuous professional development, may have taken their destinies in their own hands to self-fund and engage in personal training to increase their skills.

Needs assessment of laboratory staff and laboratory operations is vital for customising training content.<sup>[2]</sup> The generation of data through disease surveillance and notification systems is critical for appropriate planning, disease-outbreak investigations, emergency preparedness and responses.<sup>[14]</sup> The trend observed in this study, where management's input in training programmes was minimal, may not translate to improved service delivery, as training sought and obtained may not be tailored to the specific needs of the time, organisation and community. Participants who sponsored their own training programmes may also be unwilling to transfer acquired knowledge to other co-workers to personally remain indispensable in a specific work area. There is a need for increased involvement of management in the articulation and sponsorship of in-service training programmes for medical laboratory scientists.

Training was mostly received in the area of instrumentation and diagnostic techniques. The provision of accurate and prompt diagnosis of diseases can be greatly enhanced by increased knowledge in novel diagnostic technologies. For example, the recognition of new infectious agents and the global emergence of antimicrobial resistance make this investment justifiable. Sadly, however, emphasis on such areas as biosafety and quality assurance was low. The safety of laboratory personnel working in diagnostic laboratories is critical in ensuring the continued delivery of laboratory services. Safety training programmes are essential in maintaining safety awareness among laboratory and support staff.<sup>[11]</sup> Laboratory quality assurance has been summarised as the total process that guarantees the right result, at the right time, on the right specimen, from the right patient, at the right price.<sup>[15]</sup> This includes procedures beyond the analytical phase of laboratory testing such as collection of appropriate specimens and registration of specimens to clear reporting of results, cutting across pre-analytical, analytical, post-analytical and managerial aspects of laboratory organisation. Poor emphasis on training in such critical areas such as quality assurance may undo the impact of other training received and jeopardise quality of test results, as mistakes from analytical procedures alone have been reported to account for a minimal percentage of errors in the clinical laboratory testing process.<sup>[16,17]</sup>

## Conclusion

In summary, 84/127 (66.1%) volunteer medical laboratory scientists reported to have attended an in-service training programme. However, the percentage of volunteers who received training during the 12 months prior to the survey was poor, as was employers' involvement in training needs of laboratory workers. Adequate assessment of training needs and effective criteria for the selection of training participants are crucial to the success and overall impact of laboratory service delivery. There is a

need for strengthening of laboratory capacity by increasing the emphasis on the training needs of laboratory personnel by the relevant authorities and agencies. Intervention and donor agencies such as the US Presidential Emergency Plan For Aids Relief (PEPFAR), which are involved in the strengthening of laboratory capacity, can provide funds and other training needs to build the capacity of laboratory personnel in Nigeria.

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## Appendix 1. Questionnaire

This exercise is aimed at assessing the type and frequency of in-service training received by Medical Laboratory Scientists in Benin City. Your candid opinion on questions asked is highly solicited to guarantee the exactness of our conclusions. Participants and affiliation confidentiality will be maintained.

1. Gender \_\_\_\_\_
2. Area of specialisation \_\_\_\_\_
3. Year of first degree in Medical Laboratory Sciences \_\_\_\_\_
4. Highest academic/professional qualification with date (year) \_\_\_\_\_
5. Type of affiliation  
 Public institution                       Private institution
6. Ever had training on your job?  
 Yes     No
7. Place of training  
 Within organisation                       Outside organisation
8. Specify areas of training received  
 \_\_\_\_\_  
 \_\_\_\_\_
9. Had training in the last year?  
 Yes     No
10. Sponsor of training programmes received (please indicate all sponsors of training programme)  
 \_\_\_\_\_  
 \_\_\_\_\_