Factors influencing increased expertise for a sustainable workforce at a research centre in South Africa

S. Brand,¹ H. R. Draper,¹ D. A. Enarson,^{1,2} N. Beyers,¹ M. Claassens¹

<http://dx.doi.org/10.5588/pha.14.0057>

Setting: The Desmond Tutu Tuberculosis (TB) Centre (DTTC), Stellenbosch University, South Africa.

Objectives: 1) To determine whether access to designated funding is associated with the development of expertise in employees, and 2) which other factors are associated with the development of expertise in employees.

Design: This was a retrospective study. The target population consisted of all employees at the DTTC during the period 1 January 2004 to 31 December 2011. Improvement in expertise during employment was the primary outcome; the secondary outcome was an increase in educational level linked to the National Qualifications Framework.

Results: There was no association between access to funding and expertise development, but an association between the number of months employed and improvement of expertise during employment was observed (OR 1.03, 95%CI 1.02–1.04, $P < 0.001$), controlling for age at appointment, sex, access to designated funding and education level.

Conclusion: The study shows that almost a third of employees increased their expertise, more than 90% had access to designated funding and personnel employed for a longer duration were more likely to experience improvements in expertise. We encourage research organisations in low- and middle-income countries to implement strategies to retain employees in order to build their expertise.

The skills shortage in South Africa is reflected in health services as well as in research capacity.¹ Capacity strengthening is highlighted in the report on an overview of health sector reforms in South Africa published in December 2011, and general recommendations include the need to empower front-line health care workers.²

As education and skills development is one of the Millennium Development Goals (Bellagio goals) that are to be achieved by 2015, capacity strengthening in health care workers should be a priority.³ Health care researchers performing implementation research embedded in health systems, thereby improving these systems, need training for similar reasons. Capacity strengthening by training to improve expertise and qualifications is one of the priorities at the Desmond Tutu Tuberculosis (TB) Centre (DTTC).

At entry level, most of our research workers have a grade 12 school-leaving certificate, the National Senior Certificate in South Africa. Pupils study at least seven

subjects, including two compulsory official South African languages, either mathematics or mathematical literacy, life orientation and three elective subjects. Once this is completed, they are not prepared for the labour market, and capacity strengthening is needed to increase their skills. The Centre's management is therefore constantly seeking novel methods to improve the expertise and qualifications of all employees, including support and administrative staff, not only of those appointed to academic research positions.

The European Union Research on Psychological Contracts across Employment Situations (the PSYCONES project) found that the type of employment contract was significantly associated with employment sustainability. There was a higher level of self-sufficiency and skills development among permanent employees compared to temporary employees, and reduced commitment to the employer among temporary employees.⁴ Another study indicates that temporary employees are more likely to have job insecurity compared to permanent employees, experience less independence, perceive their job as less challenging and feel they have fewer training prospects.⁵

Unless temporary and permanent employment is well defined, the variety of employment arrangements within different industries might make observations from different studies or surveys difficult to interpret or compare. Few studies report on whether specific funding for training is associated with increased skills.

Our study measured whether access to designated funding for training in a research centre was associated with a subsequent increase in employee expertise or educational level linked to the National Qualifications Framework (NQF). We also investigated whether other factors were associated with the development of expertise among employees.

METHODS

Study setting

The study was conducted at the DTTC Department of Paediatrics and Child Health, whose main offices are situated at the Faculty of Medicine and Health Sciences of Stellenbosch University. In addition, field offices are situated in various communities and townships in the Cape Town metropolitan area and other districts of the Western Cape. The main activities of the DTTC are research and training focused on TB and the human immunodeficiency virus (HIV). All re-

AFFILIATIONS

- 1 Desmond Tutu TB Centre, Department of Paediatrics and Child Health, Stellenbosch University, Cape Town, South Africa
- 2 International Union Against Tuberculosis and Lung Disease, Paris, France

CORRESPONDENCE

Sterna Brand, Desmond Tutu TB Centre
Department of Paediatrics and Child Health
Stellenbosch University
PO Box 19620 Parow
Tygerberg
Cape Town
Western Cape 7505
South Africa
Tel: (+27) 219 389 755
Fax: (+27) 219 389 719
e-mail: slbrand@sun.ac.za

ACKNOWLEDGEMENTS

This research was supported by a United States Agency for International Development (USAID) Cooperative Agreement (TREAT TB-Agreement no. GHN-A-00-08-00004-00). The contents are the responsibility of the authors and do not necessarily reflect the views of USAID. We are grateful to them for supporting this initiative. We are also grateful to R Dunbar and J Arendse, who contributed to the data collection, input and data analysis process. Conflicts of interest: none declared.

KEYWORDS

employee retention; capacity building; training

Received 28 May 2014
Accepted 3 October 2014

PHA2014;4(4):276–280
© 2014 The Union

search studies are funded by external research funding organisations — funding always includes funds for protocol-specific training, and specific funds are sometimes designated for additional training.

Study design and target population

This was a retrospective cohort study. The target population consisted of all the individuals employed at the DTTC, working either at the main or the field offices and sites during the period from 1 January 2004 to 31 December 2011. All employees were appointed according to the Stellenbosch University employment guidelines and the employment category and job description defined the post level. The study included all post levels, from field researchers to senior management, academic as well as support staff, and temporary as well as permanent employees. We excluded external consultants and contractors.

Data collection, instruments and variables

Electronic data were retrieved from the business information system of Stellenbosch University. Additional data were retrieved from paper records kept at the DTTC and the main human resources (HR) office. Data were captured on a case report form (CRF) and filed in a locked cabinet. On the CRF, the following information was recorded: 1) from the business information system: personnel number, first name, family name, sex, ethnic group, date of birth; 2) from the paper records and training statistics: skills development information, namely courses attended, degrees enrolled on and awarded and any increase in education level information as per the NQF level; and 3) from the hard copy human resources (HR) files: contract start date, contract end date, contract termination date (if the reason for leaving employment was not end of contract), reason for termination, NQF level of qualification at contract start date, educational level at contract end date or at termination date, courses attended and dates courses completed, degrees enrolled on, enrolment dates for degrees, degrees completed, completion dates for degrees, designated funds used for sponsored training (some studies had designated funding for training and we could identify these), and source of funding.

In addition to these designated funds from the various research studies, funding is available for training from Stellenbosch University — any Stellenbosch University employee can apply for this funding.

Definitions

'Designated funding' was defined as funding provided by the research funding available for additional training and capacity building on application from the staff employed on that specific study, and not only study protocol-specific training.

'Access to designated funding' was defined as funding within the research study to which employees are appointed. Employees are encouraged to apply for funding support to improve their expertise or to increase their educational level. The funding support is approved by senior management, including the HR manager. Funds within each study budget are managed by the principle investigator and the research grants and finance office of the University.

'Improved expertise' was defined as any additional new skill obtained, but not a study protocol-specific skill. An 'increase in educational level' was defined according to the NQF. The South African NQF consists of 10 levels and is divided into three bands; levels 1–4 are equal to high school grades, levels 5–7 are college diplomas and technical qualifications, and levels 8–10 are university degrees.

'Capacity building' was defined as improving research workers' skills through training.

'Temporary contracts' were defined as an employment term of ≤ 12 months and permanent contracts as an employment term of > 12 months.

Data management

The data in the CRFs were dual entered into a Microsoft Access® (Microsoft Corp, Redmond, WA, USA) database. Names were replaced by a unique computer-generated study number (barcode) once the CRF data had been entered, ensuring confidentiality. Only the principal investigator, data developer and data analyst had access to the database. The database was locked and protected by a secure password. The hard copy HR files were locked in a secure location at the DTTC.

Data analysis

Demographic and employment variables were reported using descriptive statistics to summarise the study population. Continuous variables were reported using medians and interquartile ranges, while categorical variables were reported using frequencies and percentages. Demographic and employment variables included sex, age in years at appointment, duration of employment in months, access to designated funding and educational level at time of appointment. These variables were analysed to determine whether an association with improved expertise existed using the χ^2 or Fisher's exact test for categorical variables or the Mann Whitney U test for continuous variables. In cases where data were unbalanced, or if there were any low-frequency or empty cells, results from the Fisher's exact test were reported. Improved expertise and increase in educational level were assessed using the χ^2 test to determine any associations with access to designated funding for training.

Univariable and multivariable logistic regression analysis was used to determine whether an improvement in expertise was associated with sex, age, duration of employment, access to designated funding or education level. Education at appointment was analysed using three groups: 1) grade 12, certificate or diploma as the reference group; 2) Bachelor's degree or honours; and 3) Master's degree, PhD or other post-graduate studies. Months employed and age were analysed as continuous variables. Designated funding was the variable of interest; it was therefore included in the model regardless of its univariable logistic regression P value. The other variables were included if they had a univariable P value < 0.20 . Data were analysed using Stata 12.1 special edition software (Stata Corporation, College Station, TX, USA).

Ethics approval

Ethics approval was obtained from Stellenbosch University's Health Research Ethics Committee and the Ethics Advisory Group (EAG) of the International Union Against Tuberculosis and Lung Disease. The ethics application included a request to waive consent, as this was an analysis of existing records to which the principal investigator had access in her capacity as HR manager. There was minimal risk involved in the study. All data retrieved were viewed as confidential. No information on an individual level was made public and names were replaced by a unique study number (barcode).

RESULTS

Table 1 displays the demographic and employment characteristics of the study population. The median age of the DTTC employees at the time of appointment was 33.3 years (IQR 27.7–40.6);

TABLE 1 Demographic and employment characteristics of Desmond Tutu TB Centre employees at appointment between 2004 and 2011 (*N* = 399)

	<i>n</i> (%)
Age at appointment, years, median [IQR], (<i>n</i> = 389)*	33.3 [27.7–40.6]
Male sex	95 (23.8)
Designated funding (%)	360 (90.2)
Duration of employment, months, median [IQR], (<i>n</i> = 398)*	22.1 [10.9 – 39.0]
Level of qualification at appointment (<i>n</i> = 334)*	
Grade 12	8 (2.4)
Certificate	30 (9.0)
Diploma	144 (43.1)
Bachelor's degree	80 (24.0)
Honours degree	28 (8.4)
Master's degree	16 (4.8)
Doctoral degree	26 (7.8)
Other post-graduate studies	2 (0.6)

*Sample size <399 due to missing data.
IQR = interquartile range.

95/399 (23.8%) were male. A total of 360/399 (90.2%) employees had access to designated funding and the median duration of employment was 22.1 months (IQR 10.9–39.0). Of 334 employees with a reported level of qualification at appointment, the highest qualification in 182/334 (54.5%) was grade 12, certificates or diplomas, while 44/334 (13.2%) employees held a Master's degree, a PhD or another post-graduate degree. The median age at appointment was similar among employees with and those without access to designated funding (33.3 vs. 33.9 years, $P = 0.637$). Sex was not associated with access to designated funding (24.4% vs. 18.0%, $P = 0.433$). Employees with access to designated funding were employed for longer than employees without (24 vs. 12 months, $P = 0.009$).

Of the 399 employees, 111 (27.8%) had documentation of improved expertise, while 288/399 (72.2%) did not (Table 2). For those with documentation of improved expertise in comparison to those without, no difference was observed in access to desig-

nated funding (101/111 [91.0%] vs. 259/288 [89.9%], respectively, $P = 0.852$). Four employees had an increase in NQF level, and all of them had access to designated funding. No association between an increase in NQF educational level and access to designated funding was detected ($P = 1.000$).

Table 2 reports the unadjusted and adjusted odds ratios (OR) to determine which factors were associated with an increase in expertise. In the univariable analysis, sex, access to designated funding and level of qualification at appointment were not associated with an increase in expertise. Duration of employment was associated with an increase in expertise (OR 1.03, 95% confidence interval [CI] 1.02–1.04, $P < 0.001$), as was age at appointment when comparing those aged ≥ 45 years with those aged <25 years (OR 4.04, 95%CI 1.50–10.90, $P = 0.006$).

In the multivariable analysis, duration of employment, age at appointment, sex and access to designated funding were included in the model. Duration of employment remained associated with an increase in expertise (OR 1.03, 95%CI 1.02–1.04, $P < 0.001$), as did age at employment comparing those aged ≥ 45 years with those aged <25 years (OR 3.27, 95%CI 1.17–9.16, $P = 0.024$).

DISCUSSION

This study shows that 28% of employees at the DTTC increased their expertise, although an increase in expertise was not associated with access to designated funding. Older participants and those who were employed for a longer period of time were more likely to have an increase in expertise. If research organisations want to improve the sustainability of their workforce, they should therefore focus on having long-term rather than temporary contracts with their employees. It would also be prudent to investigate why older employees were more likely to increase their expertise. A future study could, for example, use qualitative methods to elicit reasons for this.

A major positive finding was that most of the participants (90%) had access to designated funding to increase their expertise. However, because such a small number of participants did not have access to designated funds, we could not refute the null hypotheses. We would recommend that all studies in low- and middle-income countries, especially those funded by foreign proj-

TABLE 2 Summary analysis using χ^2 or Mann Whitney U tests and estimated OR from univariable and multivariate logistic regression to determine factors associated with increased expertise

Predictor	Increased expertise (<i>n</i> = 111) <i>n</i> (%)	No increase in expertise (<i>n</i> = 288) <i>n</i> (%)	<i>P</i> value	Unadjusted*		Adjusted*	
				OR (95%CI)	<i>P</i> value	OR (95%CI)	<i>P</i> value
Months employed, mean [IQR]	34.9 [21.0–52.0]	18.0 [10.0–34.0]	<0.001	1.03 (1.02–1.04)	<0.001	1.03 (1.02–1.04)	<0.001
Age at appointment, years				overall $P = 0.032$		overall $P = 0.115$	
<25	7 (6.4)	44 (15.8)		Ref		Ref	
25–34	45 (40.9)	130 (46.6)		1.90 (0.78–4.65)	0.159	1.66 (0.66–4.16)	0.284
35–44	33 (30.0)	76 (27.2)		2.32 (0.92–5.84)	0.073	1.90 (0.73–4.93)	0.185
≥ 45	25 (22.7)	29 (10.4)	0.002	4.04 (1.50–10.90)	0.006	3.27 (1.17–9.16)	0.024
Male sex	20 (18.0)	75 (26.0)	0.092	0.63 (0.35–1.13)	0.121	0.69 (0.37–1.29)	0.246
Access to designated funding	101 (91.0)	259 (89.9)	0.852	1.25 (0.58–2.69)	0.574	1.01 (0.44–2.32)	0.982
Level of highest qualification at appointment				overall $P = 0.956$			
Grade 12, certificate or diploma	57 (54.3)	125 (54.6)		Ref			
Bachelor's degree or honours	34 (32.4)	74 (32.3)		1.08 (0.64–1.82)	0.765	—	
Master's degree or PhD	14 (13.3)	30 (13.1)	0.998	1.03 (0.50–2.08)	0.946	—	

*326 patients included in the univariable and multivariable logistic regression analysis.
OR = odds ratio; CI = confidence interval.

ects, should include dedicated funds in the budget for additional training of staff.

One of the challenges faced in South Africa, like many other middle- and low-income countries, is the creation of a skilled labour force.⁵ The current shortage in skills and expertise is affecting the country's ability to compete globally — this is also true in the biomedical research field.⁵ Quality of training and development issues must be addressed by policy makers⁶ and educators, but we believe research organisations at universities and research funding organisations should share this responsibility. Support for training programmes is a major deficit in universities in South Africa, and research funding bodies may be able to help meet this need.⁷ Capacity strengthening on both an individual and an organisational level, as stated in the 1998 Swiss Commission, is a concern for research partners.⁸ In this study we investigated whether there was an increase in the expertise necessary to build research capacity. This is promoted by Emanuel et al., who said 'Communities should benefit from collaborative partnerships between researchers and funders. Such benefits might include employment and training of employees from the specific community',⁹ and reiterated in a recent article commenting on the importance of skills transfer from higher- to lower-income countries, and promoting equity as part of the global health research agenda.¹⁰ At the DTTC, we aim to employ individuals from the communities in which we work. In our study, we therefore investigated whether individuals from the communities in which our research is conducted had improved their expertise.

Retention of employees is important,¹¹ and universities can adopt a variety of tactics to achieve this,⁷ one of which is skills development.⁵ Strengthening the skills development capacity of health research organisations could influence the ability to improve health outcomes, which is crucial in low- and middle-income countries.¹² Employees who had access to designated funding were employed for a longer period of time ($P = 0.09$). A longer period of employment was also independently associated with an increase in expertise, and it could be argued that access to designated funding served as a motivational factor to improve employee retention, which in turn led to an increase in expertise.

Limitations

Although there were 399 subjects in the study population, the group without designated funding was small, and all employees had access to university training funding, which might have led to designated funding not being associated with increase in expertise. These results should therefore be interpreted with caution. Missing data could have introduced a bias, but the proportion of missing data was low, as shown in the tables.

CONCLUSION

The results of our study show that almost a third of employees increased their expertise and that more than 90% had access to research funds designated for training, while all had access to university training funds. Older personnel employed over a longer period of time were more likely to gain expertise. We need to investigate why not all employees applied for additional training. We believe that increasing expertise in employees should be part of all research studies and should be a shared responsibility, as in the present study, between the research funders and in-country organisations — in our case Stellenbosch University. We would encourage other research organisations in low- and middle-income countries to also document skills development among employees and to implement strategies to retain their employees in order to build expertise and research capacity.

References

- 1 Breier M. The shortage of medical doctors in South Africa. Scarce and critical skills Research Project. Pretoria, South Africa: Human Sciences Research Council, 2007: pp 97. http://www.labour.gov.za/DOL/downloads/documents/research-documents/Medical%20Doctors_DoL_Report.pdf Accessed October 2014
- 2 Schaay N, Sanders D, Kruger V, Olver C. Overview of health sector reforms in South Africa. London, United Kingdom: DFID Human Development Resource Centre, 2011: pp 48.
- 3 Bates-Earner N, Carin B, Lee MiH, Lim W, Kapila M. Post-2015 development agenda: goals, targets and indicators. Waterloo, ON, Canada: CIGI/KDI, 2012: pp 64.
- 4 European Commission. EU Research on Social Sciences and Humanities: psychological contracts across employment situations: PSYCONES. Brussels, Belgium: European Commission, 2007: pp 188. <http://cordis.europa.eu/documents/documentlibrary/100123961EN6.pdf> Access October 2014
- 5 De Cuyper N, De Witte H. Job insecurity: mediator or moderator of the relationship between type of contract and various outcomes. *S Afr J Ind Psych* 2005; 31: 79–86.
- 6 Ngwenya B M. Training and development as a key to enhance employees productiveness at Tshwane University of Technology (TUT). Pretoria, South Africa: University of South Africa, 2010: pp 90.
- 7 Gluck M, Blumenthal D, Stoto M. University-industry relationships in the life sciences: implications for students and post-doctoral fellows. *Res Policy* 1987; 16: 327–336.
- 8 Swiss Commission for Research Partnership with Developing Countries (KFPE). Guidelines for research in partnership with developing countries. Basel, Switzerland: KFPE, 1998: pp 32.
- 9 Emanuel E J, Wendler D, Killen J, Grady C. What makes clinical research in developing countries ethical? The benchmarks of ethical research. *J Infect Dis* 2004; 189: 930–937.
- 10 Chu K M, Jayaraman S, Kyamanywa P, Ntakyiruta G. Building research capacity in Africa: equity and global health collaborations. *PLOS Med* 2014; 11: e1001612.
- 11 Hassan W, Razi A, Qamar R, Jaffir R, Suhail S. The effect of training on employee retention. *Glob J Manag Busin Res* 2013; 13: 17–20.
- 12 Ijsselmuiden C, Marais D, Becerra-Posada F, Ghannem H. Africa's neglected area of human resources for health research – the way forward. *S Afr Med J* 2012; 102: 228–233.

Contexte : Le Centre Antituberculeux Desmond Tutu (DTTC), à l'Université de Stellenbosch, en Afrique du Sud.

Objectifs : 1) Déterminer si l'accès au financement est associé au développement d'une expertise chez les employés, et 2) déterminer quels autres facteurs sont associés au développement de l'expertise des employés.

Schéma : Cette étude était rétrospective. La population cible était constituée par les employés du DTTC entre le 1^{er} janvier 2004 et le 31 décembre 2011. L'amélioration de l'expertise pendant la période de fonction était le premier résultat attendu ; le deuxième était une augmentation du niveau de connaissances en relation avec le Cadre National de Certification.

Résultats : Il n'a pas été démontré d'association entre l'accès au

financement et le développement de l'expertise, mais on a mis en évidence une association entre le nombre de mois de travail et cette amélioration (OR 1.03 ; IC95% 1,02–1.04 ; $P < 0,001$), en contrôlant l'âge lors de l'entrée en fonction, le sexe, l'accès au financement et le niveau d'instruction.

Conclusion : L'étude montre que près d'un tiers du personnel a accru son expertise, plus de 90% ont eu accès au financement et que les personnes employées pendant une durée plus longue avaient davantage de chances d'améliorer leur expertise. Nous encourageons les organismes de recherche des pays à revenu faible et moyen à mettre en œuvre des stratégies visant à retenir leur personnel afin de renforcer leur expertise.

Marco de referencia: El Centro Desmond Tutu de atención de la tuberculosis (DTTC) de la Universidad Stellenbosch en Suráfrica.

Objetivos: 1) Determinar si la obtención de atribución de financiamientos contribuye a perfeccionar la competencia profesional de los empleados; y 2) definir los demás factores que fomentan el mejoramiento de la pericia de los profesionales.

Método: Fue este un estudio retrospectivo de los empleados del DTTC del 1^o de enero del 2004 al 31 de diciembre del 2011. El principal criterio de evaluación fue el perfeccionamiento de la competencia profesional de los empleados durante el tiempo de ocupación del cargo. El criterio secundario fue el progreso académico de los profesionales, según los criterios del Marco Nacional de Cualificaciones.

Resultados: No se observó ninguna asociación entre el acceso al financiamiento y el mejoramiento de las competencias, pero la

duración en meses en el empleo se asoció con un progreso en los conocimientos y la experiencia de los empleados (OR 1,03; IC95% de 1,02 a 1,04; $P < 0,001$), una vez corregidos los datos en función de la edad del nombramiento, el sexo, el acceso a la atribución de financiamiento y el grado de instrucción.

Conclusión: Los resultados del estudio ponen de manifiesto que cerca de un tercio de los empleados perfeccionó sus competencias, más del 90% contaba con acceso a la atribución de financiamiento y que era más probable que las personas empleadas por períodos más prolongados mejorasen sus conocimientos teóricos y prácticos. Se recomienda a las organizaciones de investigación de los países con recursos medianos y bajos que introduzcan estrategias encaminadas a fidelizar a sus empleados, con el fin de mejorar y consolidar las competencias.