

Chapter 4: Where do graduates go? Developing a graduate tracking system: the experience of THEnet

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4.1 Introduction

This chapter describes how health worker education and training institutions can collaborate with local and national health system partners to develop and operate their own in-country tracking system to monitor where their graduates practise and the clinical activities that they undertake. Information collected by human resources for health (HRH) graduate tracking studies can provide valuable feedback to educational institutions and health planners on the proportion of graduates who are contributing to priority health workforce needs, allow identification of gaps, and inform HRH policy and planning at national and local levels.

Making changes to health worker education, training, planning and policy requires commitment by institutions, policy-makers and governments, as well as timely access to appropriate and quality data on HRH graduate workforce attributes and outcomes so that evidence-informed policies can be developed in support of health care delivery. As an example, several health professional schools with a social accountability mandate, members of the Training for Health Equity Network (THEnet),¹ have been collecting workforce outcomes data on their graduates to inform planning and policy at their schools.

HRH tracking studies employ a systematic process to collect, monitor, and evaluate data on HRH graduates over their careers (from pre-admission into full practice). Results include data on where graduates practise, the type of practice they choose, the populations they serve, and the services and care that they provide.

In 2008, THEnet established a consortium of health professions schools striving toward social accountability. At THEnet's first meeting in Havana, Cuba, (Pálsdóttir and Neusy, 2011) it was agreed to amend WHO's definition of social accountability, from:

"...the obligation to direct their education, research and service activities towards addressing the priority health concerns of the community, region, and/or nation they have a mandate to serve. The priority health concerns are to be identified jointly by governments, health care organizations, health professionals and the public." (Boelen and Heck, 1995)

to have a greater focus on the underserved, defined as communities that have the least opportunity to access health services and health professionals because of geography, socioeconomic status, ethnicity, culture, or caste (Larkins et al., 2013):

"... The priority health concerns are to be identified jointly by governments, health care organizations, health professionals and the public (and especially the underserved)." (Ross et al., 2014)

THEnet and member schools recognized the need for collaboration to systematically build a common evidence and knowledge base on social accountability in health professional education. The first step was to create a list of 10 key educational and social principles, aspiring towards social accountability (Table 4.1). The second was to develop the Framework for Socially Accountable Health Workforce Education²; Larkins et al., 2013; Ross et al., 2014) to identify key

¹ <https://thenetcommunity.org/>

² <https://thenetcommunity.org/the-framework/>

factors that affect a school's ability to educate health workers who will positively influence health outcomes and health system performance. The framework also outlined ways to measure and improve the outcomes across institutions and contexts. The third step was to collectively develop questionnaires designed for longitudinal tracking of students from intake to graduation and beyond (Larkins et al., 2015; 2018; Johnston et al., 2020).

Table 4.1 THEnet key educational and social principles, and member schools

THEnet principles	THEnet member schools
<ol style="list-style-type: none"> 1. Education, research, and service programmes are guided by the health and social needs of targeted communities. 2. Students are recruited from communities with the greatest health needs. 3. Programmes are located in or near the communities they serve. 4. A significant part of the learning experience takes place in primary care settings. 5. The curriculum integrates basic, clinical, population, and social science, including the social determinants of health. 6. Teaching methods centre on the student, patient, and population; are service based, emphasize teamwork; and benefit from information technology. 7. Programmes are embedded in the health system in partnership with health system actors to produce locally and regionally relevant competencies. 8. Programmes recruit and train community-based practitioners as teachers and mentors. 9. Programmes emphasize a commitment to public service, with faculty members serving as role models. 10. Social accountability is reflected across all departments and in the commitment from school leadership. 	<p>Full members</p> <ul style="list-style-type: none"> • Ateneo de Zamboanga University School of Medicine, Mindanao, Philippines • Ghent University, Ghent, Belgium • Gezira University, Wad Madani, Sudan • James Cook University School of Medicine, Townsville, Australia • Latin American School of Medicine, Havana, Cuba • Northern Ontario School of Medicine, Thunder Bay/Sudbury, Canada (now known as NOSM University) • Patan Academy of Health Sciences, Kathmandu, Nepal • Université de Sherbrooke, Sherbrooke, Canada • University of New Mexico, Albuquerque, United States of America (USA) • University of the Philippines, School of Health Sciences, Leyte, Philippines • Walter Sisulu University, Mthatha, South Africa <p>Collaborative partners</p> <ul style="list-style-type: none"> • University of KwaZulu-Natal, Durban, South Africa • Mzuzu University, Faculty of Health Sciences, Malawi • Imperial College of Science, Technology and Medicine, London, United Kingdom • L'Université Officielle de Bukavu, Bukavu, Democratic Republic of the Congo

Note: All THEnet member schools aspire to these key educational and social principles, adjusted to national and subnational context.

This chapter builds upon the international collaboration of THEnet schools to provide policy and decision-makers with an understanding of:

- How tracking fits into the broader context of HRH planning.
- The benefits of tracking.
- An overview of tracking methodologies.
- The planning questions that tracking can address.

The chapter describes a “ground-up” approach that can be initiated by health professional schools and can be readily scaled-up into national HRH planning frameworks compatible with the WHO national health workforce accounts (NHWA) (WHO 2017; 2018, 2019). The first part provides an overview of context, benefits, methodologies and questions answered by tracking studies. Case studies follow providing more specific details on the international tracking study led by THEnet and on selected school-based tracking studies.

4.2 The case for HRH graduate tracking in health workforce planning

The maldistribution of health workers can only be partially addressed by increasing the number of health workers; attention must be paid to the selection, education, and training of a fit-for-purpose health workforce with an approach that spans the career of the worker, and considers the subnational, national and international health labour market (HLM) context. A system- and evidence-informed approach to planning HRH is needed, coupled with an embedded process for monitoring the selection, education and training, graduate outcomes, continuing education (CE) and support needs, and retention. This approach includes a contextually based understanding of:

- The various factors that might influence practice types and locations of graduates (e.g. recruitment and retention).
- The available health workforce cadres, and their roles and proportions in health care teams.
- Applicable plans and policies.

In this chapter, **HRH tracking** is defined as a systematic process to collect, monitor and evaluate data on HRH graduates’ personal, educational and career characteristics over their professional life. This takes into account that graduate career and working pathways are influenced by national HRH policies, institutional and educational strategies and experiences, national regulatory and policy environments, and other initiatives to improve universal health coverage (UHC) and strengthen health systems.

Over time, this approach can influence policy and inform educational and institutional strategies to produce a health workforce responsive to local and national population health needs.

THEnet aligned schools have come together to track their programme graduates to better understand the motivations and influences that determine their graduates' career path decisions. Having this information provides an opportunity for institutional decision-makers to determine approaches to education and training to fill gaps in local health care delivery. Making changes to subnational and national health care systems requires commitment at all levels and this commitment requires evidence from tracking studies so that governments can introduce policies to leverage change in the needed direction (Strasser et al., 2019).

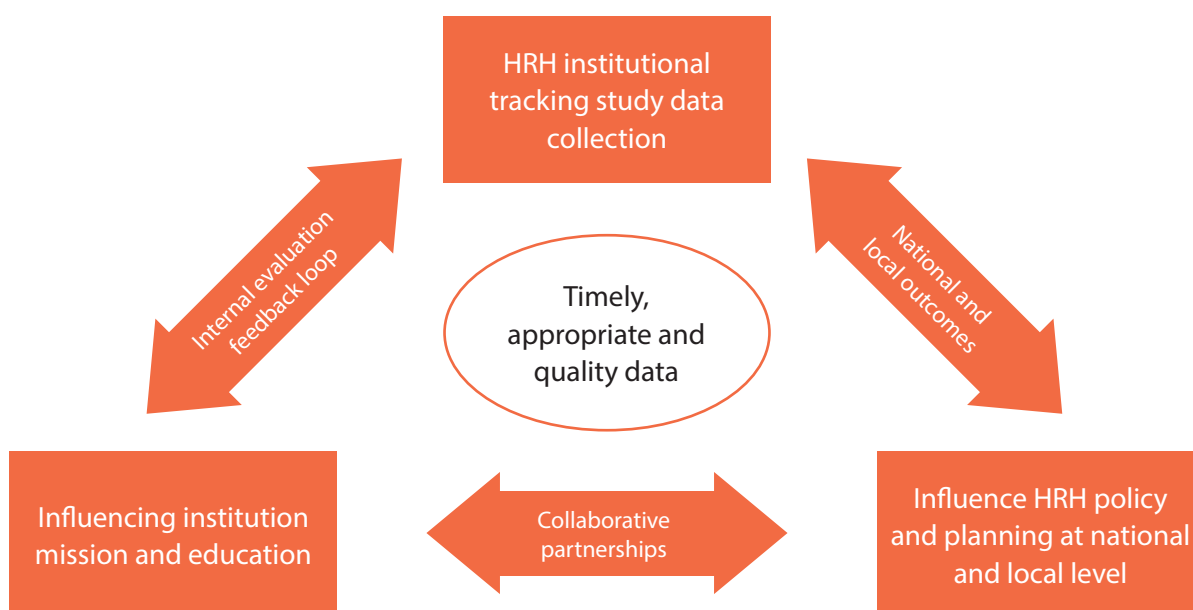
In moving beyond producing greater numbers of health care workers, countries now consider whether these health workers are practising where they are needed, delivering the services needed by the population, and contributing to UHC (OECD, 2016; WHO, 2016a; Pálsdóttir et al., 2017). HRH tracking studies provide the evidence to effect positive change in HRH planning and in the health system by explicitly aligning student selection, education, training, and continuing professional development of the health workforce with the health care needs and attributes of the population.

4.3 The benefits of HRH graduate tracking

Most evidence from tracking studies has come from medical education institutions and typically from high-income countries (HICs) (Hogenbirk et al., 2016; Woolley et al., 2019). A wider perspective is warranted to track additional cadres, to increase the coverage of low- and middle-income countries (LMICs) (Halili et al., 2017; Siega-Sur et al., 2017), and to consider other contextual and intersectoral factors that influence retention and provide support to graduates over their career (Sousa et al., 2013; Larkins et al., 2018). Including HRH tracking studies as part of the core business of health and education planners can help make explicit links between selection, education, practice, and population health.

HRH tracking studies include a longitudinal component that can contribute to the development of progressive, reliable, up-to-date HRH information systems (HRHIS) (WHO, 2017b) and strengthen institutional capacity to collect, analyse, and manage data needed to assess educational policies and strategies (Fig. 4.1). Tracking study data can also contribute directly to development and refinement of HRH planning and policy initiatives.

Fig. 4.1 The role of HRH tracking studies in influencing education institutions, and national health workforce planning and policy



Schools already invested in how their graduates perform often conduct tracking studies of their graduates and form partnerships across different cadres of health care workers to collect common data that can populate HRHIS. For example, HRH tracking studies conducted by schools can readily collect data that satisfy the minimum dataset for a health workforce registry (WHO, 2015) and span all 10 modules in the NHA handbook (WHO, 2017).

Potential solutions to the maldistribution of the workforce may be found during systematic assessment of all stages of the health worker career path. Tracking studies provide data for this assessment and supply evidence in support of changes in education programmes (WHO, 2016b).

Common benefits to tracking studies arise from assessing the match between admissions criteria and desired outcomes such as student profile, academic performance, clinical competencies, and practice locations. For example:

- Tracking studies have been used to tweak the admission process to select students who were more representative of the local population (Mian et al., 2019).
- Schools have used tracking studies to confirm that their selection process of preferentially targeting local or rural-origin students was not having any detrimental effect on graduate quality (Strasser et al., 2013; Ray et al., 2015; Halili et al., 2017; Siega-Sur et al., 2017).
- Policies such as selecting students from rural backgrounds to attend medical school have had some success in recruiting doctors into rural areas; while other strategies, such as incentives, have little to mixed success (Grobler et al., 2015). Tracking studies have been used to assess the effectiveness of these initiatives and to suggest programme improvements (Sen Gupta et al., 2014; Larkins et al., 2015; Hogenbirk et al., 2016; Halili et al., 2017; Siega-Sur et al., 2017; Wenghofer et al., 2017; Woolley et al., 2020).

Tracking studies have also contributed to the evidence-base for broader societal impacts.

For instance:

- Tracking studies have shown that educational institutions placed close to or within underserved areas increase the applicant pool from the area (Hogenbirk et al., 2016; Woolley et al., 2020) and increase application success (Mian et al., 2019). This can have a positive effect on communities' social well-being, knowing that community members can compete with the very best for these prestigious learning opportunities (Mian et al., 2017).
- The information on placements in underserved areas collected during tracking studies has been used to demonstrate financial and social benefit to these areas (Hogenbirk, Robinson et al., 2015; Pálsdóttir et al., 2016; Mian et al., 2017; Hogenbirk et al., 2021). Findings provide evidence for contributions to the broader economy (WHO, 2017b) and the Sustainable Development Goals (SDGs) (UN, 2021).

To summarize the benefits, HRH tracking studies can provide valuable information on the characteristics of individuals who come to work in underserved areas, including the age and stage in their education journey when they make long-term career decisions, and any background information that may shape their decisions. This information can provide educational institutions, governments and policy and decision-makers with a more extensive knowledge base on which to develop policy and plans on health workforce selection, education and training to better care for all populations.

4.4 Overview of tracking approaches

This section outlines how to develop a tracking study and to collect relevant data. It is based on experiences at schools located in Australia (James Cook University College of Medicine and Dentistry: Sen Gupta et al., 2014; Woolley, Halili et al., 2018; Woolley et al., 2019; and Monash University Medical School: Strasser et al., 2010; Hogenbirk, McGrail, 2015); in Canada (Northern Ontario School of Medicine: Hogenbirk, French et al., 2015; Hogenbirk et al., 2016); in the Philippines (Ateneo de Zamboanga University-School of Medicine: Halili et al., 2017; Woolley, Cristobal et al., 2018; and the University of the Philippines Manila School of Health Sciences, Leyte: Siega-Sur et al., 2017) and as part of an international collaboration (THEnet Graduate Outcomes Study [THEnet GOS]: Larkins et al., 2015; 2018).

The proposed approach can be implemented by a single school, expanded to other schools, include multiple cadres of workers, and scaled up to form the nucleus of NHWA (WHO, 2017; 2018; 2019). Single schools can also form consortia with schools in other countries. The experience of THEnet schools is a case in point.

In a school-led approach, governance initially resides within individual schools. Properly situated within national health workforce policy and planning, HRH tracking studies conducted by individual schools can help inform workforce policy and help improve access to health care at the subnational and national level.

There are four broad and interrelated stages in a tracking study:

- Building the study team, engaging stakeholders and ensuring support.
- Planning and aligning the purpose of the study with the school's mission.
- Deciding on the approach and study design.
- Collecting and analysing data, and sharing findings with stakeholders.

4.4.1 Building the study team, engaging stakeholders and ensuring support

Institution-led HRH tracking studies may find it useful to adopt the governance and support structure of national health workforce accounting systems, and thereby contribute to the alignment of education plans with national health plans (WHO, 2017, Module 9). HRH tracking studies require appropriate resources to maximize alignments between HRH education, planning and policy. For example, institutions and national programmes may need to recruit, train, and retain personnel or engage organizations that are knowledgeable about programme evaluation and research.

In addition to mobilizing people with the requisite technical skills, early involvement, and meaningful participation of stakeholders (including potential study participants) will facilitate high participation rates, ensure good quality data, and increase the chance that study findings are used to improve education, training and workforce planning. Key stakeholders include representatives of: schools; regulatory or licensing organizations; student and worker associations; government agencies; political parties; and alumni associations. Formal collaborative agreements among stakeholders can facilitate data collection, sharing and linkage. In addition, these formal collaborations can set the groundwork for a national health workforce planning organization.

Some of the questions that a tracking study can address may take several years to be answered. In-kind support from stakeholders is crucial and can leverage other financial support. Adding tracking studies of other cadres can be cost-effective, increase funding success and enable ongoing support – which requires that study benefits are communicated frequently to stakeholders and to the public. This communication starts early with a description of the stakeholder consultation process, recruitment activities, and preliminary findings. Publishing reader-friendly summaries in newsletters, websites, or broadcast emails sent to alumni and members of professional associations can help increase study recognition and participation rates. Frequent communication via social and traditional media can help maintain public awareness and political support.

Frequent communication also allows opportunities for the public, study participants and other stakeholders to provide feedback, contribute to the design and conduct of the study, and use study findings in their planning and policy-making. This feedback is used in conjunction with regular reviews of study objectives, tools and methodologies to improve the methods of the tracking study and its alignment with the stated mandate of the school, all situated within the broader context of national health workforce planning.

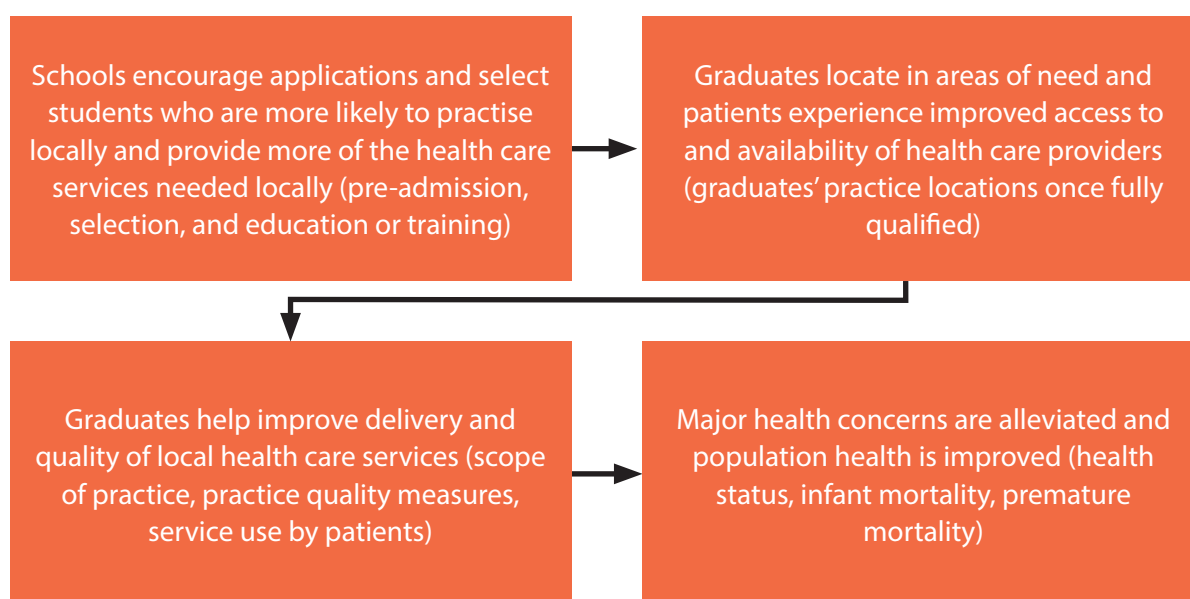
4.4.2 Planning and aligning the purpose of the study with the school's mission

Deciding why to track graduates, who to track, what data to collect, where, when, how and who should do the tracking are all directly derived from an institution's mission as well as the broader health and health workforce policy and planning context. NHWA Module 9 can help situate HRH tracking within this broader context and encourage multistakeholder dialogue, as well as support data collection in the remaining modules (WHO, 2017b).

The methods outlined below are based on tracking studies conducted by THEnet medical schools with institutional and educational strategies aligned with local, subnational, or national health care needs. The tracking study objectives of these schools follow directly from this alignment.

Developing a causal map or programme logic model can help make the alignment more explicit. For instance, a causal map can link health workers' characteristics and educational activities with desired outcomes such as improved access to appropriate health care, which can help identify the type of data to be collected (Fig. 4.2). Short-term, intermediate and long-term outcomes associated with the mission can be clarified. For example, one major intermediate outcome of schools aspiring to social accountability is to produce a significant number of graduates who choose to practise in underserved areas and provide the health care procedures and services that are most needed by people in the area.

Fig. 4.2 Sample causal map linking major inputs and outputs of a health professional education school having a social accountability mandate to improve local population health and well-being



Note: Data types are shown in parentheses.

Source: Created by the authors.

Outcomes are then linked to specific measurements. The next task is to determine the details of data collection (e.g. from whom, by whom, when, how, where) and data analysis. For each outcome, it is important to identify how the information will be used, by whom (e.g. educators, policy-makers) and for what purpose (e.g. curriculum reform, workforce planning). Intended use should also align with the tracking study's objectives and relate to national health workforce strategies.

4.4.3 Deciding on the approach and study design

Given that students graduate in groups, it is reasonable to use any of the three types of cohort designs: retrospective, cross-sectional, or longitudinal. All cohort studies are subject to biases that can limit the ability to generalize to other schools from a single study (Mann, 2003; Mamdani et al., 2005; Normand et al., 2005; Rochon et al., 2005). For instance, students self-select or are selected into schools and this limits the ability to generalize to other schools or to establish causal relationships. Cohort studies can be improved by including comparison groups (e.g. students from other schools), multiple cohorts and documenting variables that may influence the outcome. The THEnet-GOS is one example of a multischool, multicohort and multivariate study (Larkins et al., 2015; 2018, see THEnet case study). Another example is provided by two other THEnet studies

from the Philippines which compared graduates' outcomes for schools with a social accountability mandate with schools having more traditional education mandates (Halili et al., 2017; Siega-Sur et al., 2017, see the Philippines case study). Successful use of cohort study designs with careful attention to potential biases can improve the utility of study findings for health workforce planning and policy development.

The collection of quantitative and qualitative data can enhance the usefulness of study findings. For instance, counts of all graduates by practice location and services provided can be supplemented by interviews with graduates to probe the reasons why they chose that specific practice location and why they offer their chosen services. The combined statistics and stories can improve understanding, and often lead to more informed policy and decision-making by educators and health workforce planners.

Tracking studies that include core components and optional components provide the rigour and the flexibility to meet health workforce planning needs. For example, core components typically collect data on intended outcomes such as practice location and services, which are compared with actual outcomes. Optional components allow the tracking study to address emerging and urgent priorities identified by planners and policy-makers. For example, a block of questions could be added to investigate the effect of modified admissions criteria, emerging pandemics or famines, and changing economic conditions on students' career intentions. Timely analysis of data collected in these optional components can inform the development of new plans or policies to mitigate negative outcomes.

4.4.4 Collecting and analysing data

Data collection is greatly facilitated by using unique identification codes for each student or graduate, and by securely storing these data for future use in a longitudinal database (Cook et al., 2010; Gillespie et al., 2016). At a minimum, this is done by each school, but can be expanded to subnational or national levels through NHTA. These longitudinal databases enable the evaluation of educational outcomes over time and across institutions.

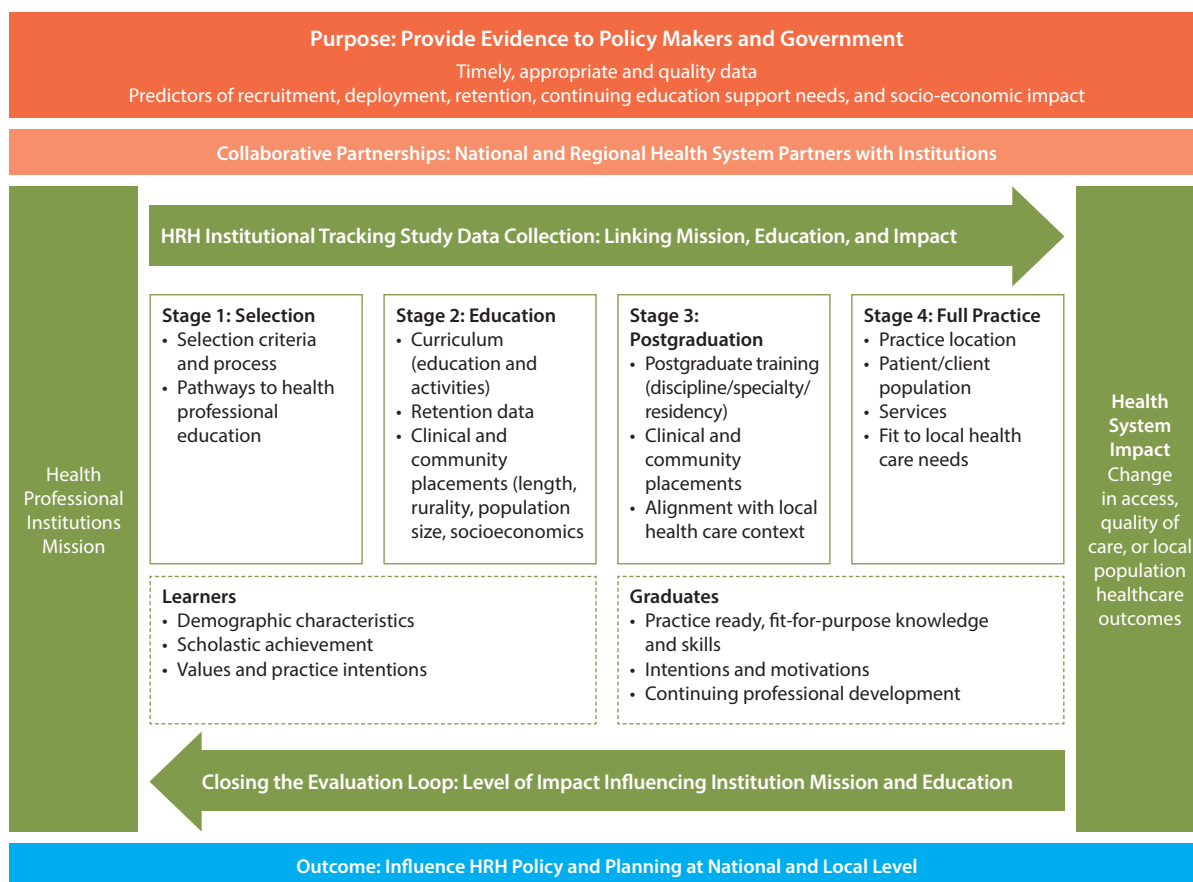
Collecting longitudinal and cross-sectional data from schools during application, education and training, and from agencies that regulate or license practice, often provides complete, accurate and reliable information. Surveys or interviews can serve to collect additional data from graduates, educators and planners, and other key informants. To ensure the follow-up needed for longitudinal data collection, it is important to ask students for their permanent contact details before they graduate and then to store this information in longitudinal databases. Alumni or professional associations are other sources of contact information for follow-up with graduates. All these efforts can help improve data quality and data coverage over the years.

Determining what data should be collected is facilitated by a framework designed for a longitudinal multiple cohort study (Fig. 4.3). This framework can be combined with a causal map (Fig. 4.2) to create a more detailed programme logic model (WK Kellogg Foundation, 2004). The data collection framework is readily adjusted to different countries, different cadres, and differing duration of education or training programmes. The framework is also consistent with and can contribute data to the NHTA modules (WHO, 2017b). THEnet schools have designed and used such an evaluation framework (Larkins et al., 2013; Ross et al., 2014; THEnet, 2021) which can be customised to specific uses (Clithero et al., 2017).

Examples of data include:

- **Stage I: Selection:** Data collected at this stage include information about learners before they begin their formal studies and about the selection or admission process (Fig. 4.3). Commonly collected data include the learners' social, economic, educational and demographic characteristics, plus similar information on parents and, if applicable, partner or spouse. Data are also collected on the selection criteria used by the school and results of the admission process. If data collection can be extended to include all applicants, then these data can be used to assess the admission process (Mian et al., 2019) and potentially adjust it to optimize the future workforce.
- **Stage II: Education:** This stage collects data on the programme and on the performance of learners (Fig. 4.3). Data collected on the programme would include the specific educational and training experiences, curriculum content, learning modalities, assessment modalities, and other attributes related to teaching and learning. Data are also collected on learners' performance during the programme as well as their perceptions about the programme. The second stage also collects information on graduates as they exit training, and includes information about their intentions and motivations at this stage in their career, as well as measures of professional competencies (clinical knowledge and clinical skills, patient-communication skills) or other desired attributes.
- **Stage III: Postgraduation:** The third stage collects data on postgraduate training similar to that collected during Stage II (Fig. 4.3). Many graduates begin limited practice during the postgraduate stage and therefore data are also collected on a broad range of practice characteristics, including geographic location, practice facility, population served, as well as procedures and services offered.
- **Stage IV: Full practice:** This stage collects data on the long-term outcomes of the educational programme namely, changes in access to and use of health care services, changes in population health and well-being, as well as changes in morbidity and mortality rates in targeted populations.

Fig. 4.3 Framework for systematic data collection during a longitudinal multiple cohort HRH tracking study



Source: Created by the authors.

Once study objectives, key outcomes and salient data are identified, it should be determined:

- How the study will be conducted (e.g. by mail, email, online, in-person, using administrative records).
- Whether new tools need to be developed for data collection.
- When the study will start (e.g. calendar year or education year) and stop (or continue indefinitely).
- Who will be studied.
- Who will conduct the study, collect and analyse data, interpret analyses and disseminate findings.
- How results will be used to inform policy and planning.

It is also important to be able to justify each of the above items to maximize the efficient use of funds and resources during the HRH tracking study.

Early identification of how data will be analysed and for which purpose(s) will help ensure that the study is meaningful to stakeholders. Ethical approval should be obtained prior to the study, in compliance with national requirements. Students and graduates should be well informed about the study and its objectives and should grant their personal consent to take part in the study and to allow future contact, thereby improving the quality, completeness, and utility of longitudinal data.

4.5 Graduate tracking in action

Longitudinal tracking of HRH students throughout their career allows for a broader range of questions to be answered at subnational and national levels about specific predictors of recruitment, deployment (practice location, discipline), retention, as well as CE and support needs. HRH tracking studies allow health workforce planners and educational institutions to identify which student characteristics and programme components influence graduate career choices, practice intentions and locations over time, and how education and training can be designed to inform these choices within a lifelong learning framework, aligned within national health workforce planning and policy directions. Four examples demonstrate HRH graduate tracking in action from different institutional environments in different parts of the world.

4.5.1 Training for Health Equity Graduate Outcome Study (GOS)

Overview: A collaboratively designed multicountry prospective cohort study, which tracks students at entry to and exit from their medical training and for up to 10 years in practice.

Context: THEnet was established in 2008 as a global community of practice of eight (initially) medical and health professional educational schools from countries from the Global South and North which shared a social accountability mandate. These schools (Table 4.1) aim to reduce health inequalities by training health workers responsive to the health and social needs of the underserved communities they serve. They do this through a range of strategies related to the selection of learners and teachers, curriculum, distributed learning and service (Pálsdóttir et al., 2008). One of the first pieces of work completed by THEnet was the development and pilot testing of a common evaluation framework so that schools could critically reflect on the degree to which they were meeting their own social accountability goals (Larkins et al., 2013; Ross et al., 2014). One important part is a longitudinal impact evaluation, which involves tracking students through their educational and training programmes and following them after graduation. Tracking will assess the degree to which the schools' activities are producing graduates who actually practise in areas of greatest need. All of THEnet's work is designed to be applicable in countries of all income group settings.

Methods: THEnet GOS is a collaboratively designed multicountry prospective cohort study, which tracks students at entry to and exit from their medical training and then for up to 10 years into practice. In 2020, it had data on over 6000 learners from nine schools in seven countries: Australia, Belgium, Canada, Nepal, Philippines, South Africa and Sudan. All students entering participating schools were invited to complete questionnaires in the first semester (entry questionnaire), and in the last semester (exit questionnaire). Questionnaires were created based on the Australian Medical Students' Outcomes Database (MSOD) questionnaires but modified for the international context through a collaborative co-design process with THEnet partners.¹

Student sociodemographic background, practice intentions, and actual practice location and discipline are collected at entry, exit and at Years 1, 4, 7 and 10 after graduation. Responses are linked by student ID number, and de-identified with a random code by staff at the school. Data can be collected either by paper or online survey. An implementation guide for each survey is shared with each participating school to help maintain common methods and ensure comparable data.²

1 Australian Medical Students' Outcomes Database and Longitudinal Tracking Project (<https://cdn.technologynetworks.com/ep/pdfs/australian-medical-schools-outcomes-database-and-longitudinal-tracking-msod-project.pdf>).

2 THEnet questionnaires and guides are available at: <https://thenetcommunity.org/graduatetracking/>.

Questionnaires at each school are identical apart from variations in the descriptors for quintiles of socioeconomic status (SES) and rurality, which are developed with the assistance of local experts from each country. One school translated the survey into Flemish (using standard back-translation approaches), but the rest of the schools administered the survey in English. The same codebook is used by all schools. Data files are entered into Microsoft Excel for cleaning (either by the participating school or coordinating school), sent to the administering partner school for inclusion in the common database and then analysed using IBM SPSS statistics. Learner and graduate sociodemographic characteristics are compared with available data on the reference population and national level health workforce data.

Governance: THEnet GOS is a collaborative project that is governed by the THEnet Board and through the THEnet Evidence Group of nominated members from all schools. Whilst THEnet has in the past received funding from Atlantic Charities Trust and the Arcadia Foundation through the Build Project 501(c3), this project has largely been conducted through in-kind contributions from partner schools, and with one part-time project officer.

Methodological decisions are made with input from the Evidence Group, as are decisions about analyses and publications to arise from the combined dataset. In line with participatory principles, it supports colleagues from LMICs to analyse and disseminate findings from their own schools, in addition to the collaborative work. Ethical approval has been obtained from all participating schools. All learners provide individual informed consent.

Benefits and findings: THEnet GOS has demonstrated that it is possible to collect data and compare findings from vastly different contexts for health professional education. In 2020, response rates by school averaged 86% at entry (minimum = 67%, maximum = 100%) and 63% at exit (minimum = 30%, maximum = 99%) (Johnston et al., 2020). This grassroots school-led approach to graduate tracking could easily be linked within countries to form regional hubs that are complementary to national level planning and monitoring frameworks, such as NHWA.

To date, findings from the THEnet GOS include:

- THEnet schools use a variety of novel selection strategies to work towards representativeness of their learner population. As a result, the demographic profile of their learners is much more representative of the profile of the populations they serve than most health professional schools (Larkins et al., 2015). Details of the match between the student profile and community population are specific to each school. However, three general examples can be given: student profiles are typically close to local population income quintiles, the proportion having rural backgrounds, and the proportion with minority status.
- Learners from rural and disadvantaged backgrounds are more likely to express an intention to work in these areas, at both entry and exit from medical school. After adjusting for confounding factors, rural and low-income background and regional location of school were the strongest predictors of intent to practise in rural location (Larkins et al., 2018).
- For learners from LMICs, intention to emigrate was more likely for learners from high-income and urban backgrounds (Larkins et al., 2018); though this intention decreased from entry to exit for those at THEnet schools (Johnston et al., 2020).
- Learners at exit were more likely to plan a career in generalist disciplines than those at entry. However, a lack of supportive health policy and unclear career pathways often limits the effectiveness of educational strategies in LMICs (Johnston et al., 2020).

Enablers and challenges: THEnet GOS would not have been possible without the community of practice of THEnet schools with a shared mission. The trust and relationships built up from working together over more than a decade have made this work possible. In addition, alignment between the goals of THEnet and the individual participant schools has facilitated this approach. This is the first study to attempt to track learners and graduates beyond the single country level, and as such provides useful lessons.

Challenges included being responsive to the diversity of contexts and cultures across countries and ensuring a balance between flexibility and adaptability to differing contexts, with methodological rigour and consistency of approach. Multiple competing demands, particularly in LMICs, posed difficulties in timely completion and contacting individual graduates. In addition, this work was done with minimal funding, posing a threat to ongoing sustainability.

4.5.2 Tracking study of graduates from SHS-Palo and ADZU-SOM medical schools in the Philippines

Overview: A “snapshot” tracking study collected cross-sectional data on the current practice locations and career choices of previous graduate cohorts, and demographic, undergraduate and postgraduate variables potentially associated with choice of practice location and medical career.

Context: The University of the Philippines Manila School of Health Sciences, Palo, Leyte (SHS-Palo) was established in 1976 in the Visayas, while the Ateneo de Zamboanga University School of Medicine (ADZU-SOM) was established 1994 on the Zamboanga Peninsula, Mindanao. The two schools developed curriculum approaches for selecting and training applicants independently but began with a similar socially accountable mission: to reduce the persistent health inequities within their local reference area, in particular, high infant and child mortality. Both schools are committed to producing socially aware and medically competent graduates who stay and practise in local medically underserved and rural communities and have the clinical competencies and knowledge of preventive and population health strategies appropriate to local priorities.

Admission to ADZU-SOM requires the applicant to have graduated from a 4-year baccalaureate (bachelor’s) degree. ADZU-SOM recruits graduate students from the Zamboanga Peninsula and neighbouring region based on their intention to practise after graduation, undergraduate grade point averages, and an interview by a panel that includes a representative from the community. About 35% of accepted students subsequently avail themselves of a scholarship based on financial need, with a return of service requirement of 1 year per year of scholarship. ADZU-SOM is unique relative to other medical schools in the Philippines in having a Doctor of Medicine-Master of Public Health (MD-MPH) programme and a problem-based learning teaching philosophy.

SHS-Palo Leyte offers a 5-year degree that also requires the applicant to have graduated from a baccalaureate degree. However, SHS-Palo is unique in the Philippines in having a “stepladder” curriculum that integrates the training of midwives, nurses and medical doctors into one continuous, sequential curriculum. This means students admitted into the medical programme earned their baccalaureate degree by first completing the midwifery and nursing levels of the stepladder curriculum. Emphasizing community need and the students’ commitment to serve, the school de-emphasizes previous academic performance in its recruitment and admissions process. Students are nominated and endorsed by rural and disadvantaged communities in need

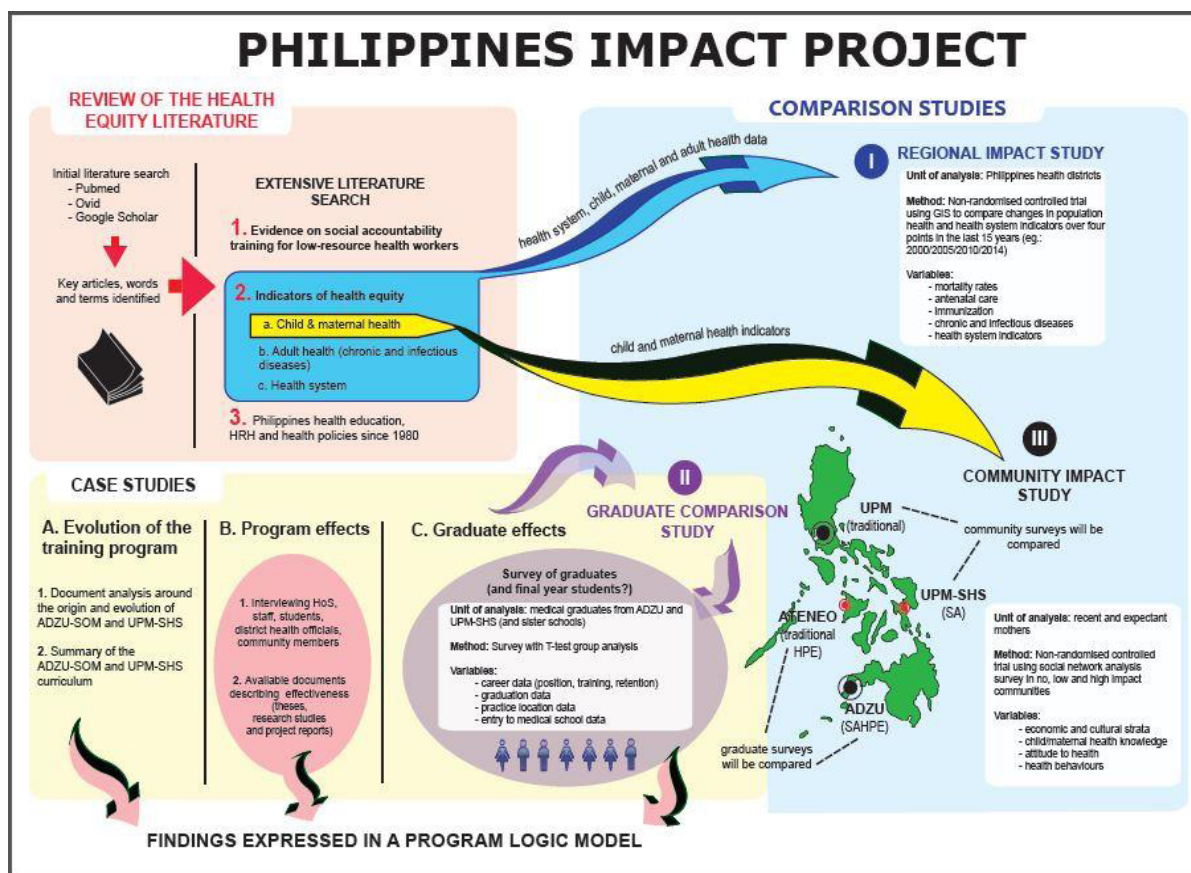
of professional health workers, and then given scholarships by the university tied to a return of service agreement to serve the endorsing community after graduation. As a response to the urgent need for rural medical doctors, SHS-Palo also admitted, for a limited period, some students who had a baccalaureate degree outside of SHS-Palo through the Philippine Government's Medical Scholarship Programme. These students had specific return of service contracts with the Department of Health to serve in pre-identified areas.

Both ADZU-SOM and SHS-Palo have maximized their service-learning approach by basing their students in rural communities for over 1 year. ADZU-SOM students spend 1 month per semester in Years 1–3, and 10 months of community placement in Year 4 (intern). This represents 50% of their training dealing with population health care concerns while the remaining half is spent on university-based learning with a weekly exposure to a hospital bedside teaching addressing individual health conditions. Both community and hospital rotations provide an immediate contextual learning experience. Similarly, SHS-Palo medical students do a 6-month community clerkship in Year 2 and another 12 months in the final (community internship) year. This builds upon the extensive community engagement they had at the midwifery and nursing levels of the curriculum. Both schools have curriculum activities that train students in public health, community development strategies, research, and the diagnosis and treatment of key local health problems. Finally, students complete significant community service and public health activities in their community immersion year. On completion of studies, both schools expect each student to have contributed positively to the health outcomes of their community.

Methods: The two Philippines schools used a cross-sectional “snapshot” tracking study design to identify previous graduates’ practice location and collect self-reported data on variables associated with graduates’ demographics, postgraduate training, and current practice (Fig. 4.4). Both studies involved a “control” medical school in the same region having a more conventional curriculum. Tracking was undertaken in 2015, with ADZU-SOM tracking graduate cohorts 2003 to 2012, and SHS-Palo tracking 1989 to 2013 cohorts, with similar cohorts used for each “control” medical school. Graduates of all schools with known addresses received a request to complete a paper or online survey.

The main objective of the tracking study was to assess whether socially accountable medical education produces significantly more positive outcomes in terms of rural and remote practice, working in public health and community development, working in public health system positions and, commitment towards community service. The survey collected data on graduates’ background (age, gender, gross family income, schooling), high school matriculation score, financial support during medical school, motivation for studying medicine, motivation for selecting their respective school, intentions at time of graduation (career, rural/urban practice and practice history (attitude to community service, preparedness for practice, current practice discipline, current practice location, current practice facility, length of employment, and medical specialization).

Fig. 4.4 Training for Health Equity Network Philippines Impact Study: study design



Source: Woolley, Christobal et al. (2017).

Governance: The tracking studies at both schools were managed by a team approach involving local investigators and research assistants together with co-investigators from the James Cook University and Flinders University medical schools. The Philippines' investigators and research assistants collected the data and entered it into Excel spreadsheets, and the international co-investigators imported the raw data into IBM SPSS software for analysis. Additional analysis involved geo-coding the graduates' current practice location and uploading these data into ArcGIS geospatial software. All investigators contributed towards writing reports and other publications. Funding was provided by THEnet as part of a series of multi-institutional collaborative research projects to gather evidence on the outcomes and impacts of socially accountable medical education. Ethical approval was obtained from the respective research ethics committees, as well as from the two conventional medical schools involved in the study.

Benefits and findings: The tracking studies allowed ADZU-SOM and SHS-Palo to show that their graduates, compared with graduates from nearby medical schools with "conventional" curricula are:

- Significantly more inclined towards community service and health equity; have greater preparedness for practising in local communities; more likely to work in rural health units, to work as public/municipal health officers and as government hospital medical officers and residents (Halili et al., 2017; Siega-Sur et al., 2017).
- More than four times as likely to be currently practising in smaller communities (< 100 000 population), more than three times as likely to be currently practising in lower socioeconomic

communities (income levels classified as 2 to 6), and twice as likely to be practising in rural municipalities in their respective regions (Woolley, Halili et al., 2018).

Enablers and challenges: Both schools' tracking study worked well using the strategy of local investigators and hired research assistants identifying graduate contact details, then collecting and entering graduate survey data, followed by the international co-investigators undertaking the quantitative analysis. The quality of the resulting publications was also enhanced by all investigators contributing significantly to the writing. However, without the funding from THEnet organization, hiring local researchers to collect and enter the data from all four schools would have been difficult under the usual budgetary constraints of regional medical schools.

Similarly, the guidance from the international co-investigators facilitated setting up the IBM SPSS databases and undertaking the analysis. Both medical schools had chosen to participate in THEnet GOS to overcome these sustainability issues.

An additional enabler was the graduates' enthusiasm for social media and a strong personal connection to their medical school, allowing schools to keep in touch with graduates and reducing the time and expense associated with identifying contact details and with distributing surveys. However, one barrier was that many graduates were practising in locations without reliable internet connection, which required more resource-intensive data collection strategies.

4.5.3 Tracking study of students and graduates at the College of Medicine and Dentistry, James Cook University, Australia

Overview: A longitudinal tracking system to assess key aspects of the James Cook University (JCU) medical school's mission and identify demographic, undergraduate or postgraduate factors that may be contributing to, or inhibiting, desired graduate outcomes.

Context: In 2000, JCU became the first medical school in Australia established outside of a major city. The main campus is based in Townsville, northern Australia, with a distributed network of clinical schools and other teaching sites across the region. JCU has a mission, underpinned by socially accountable principles, to address both the generalist and specialist medicine needs of Northern Australia by producing a workforce motivated and skilled to practise in rural and remote communities, including targeting underserved population groups (particularly local Indigenous peoples), and with a strong representation in the public health services system.

JCU has a selection process orientated towards attracting applicants from rural, remote, and indigenous backgrounds, and a 6-year curriculum with mandatory 20+ weeks of community placements, mostly in rural and remote northern towns.

JCU graduates undertake 1 or 2 years of clinical service as junior doctors, mostly in hospitals, followed by entry into generalist or specialist medical vocational training, then unsupervised (full) clinical practice after completing this "fellowship" training.

Methods: The main objective of the JCU longitudinal tracking system is to confirm that all key aspects of the medical school's mission are being achieved, and to identify demographic, undergraduate and postgraduate factors that may be enabling or inhibiting desired graduate outcomes. To achieve this objective, the tracking system involves three linked components:

- Exit survey for final year students administered by non-teaching staff at a time close to exit from the course to collect data on career intentions, known place of practice in postgraduate

year 1 (PGY 1), course improvement suggestions, and consent to be contacted for future graduate surveys.

- A tracking database to store the final year exit survey data, plus other undergraduate data from administrative databases (sex, ethnicity, residence at application to JCU, socioeconomic level of family, high school or lateral entry, participation in rural and international placements, international or domestic students, honours programme, Indigenous versus non-Indigenous Australian). In addition, the database contains publicly available graduate practice location, data obtained yearly from the Australian Health Practitioner Regulation Agency (AHPRA) website. All data are linked using the students' ID number, and then AHPRA number after graduation. The tracking database is set up using IBM SPSS software. Geographic practice location is recorded for each PGY rather than calendar year, allowing analysis to identify trends in practice location over time and between cohorts, and any demographic, undergraduate or postgraduate factors statistically associated with practice location. Data can be manipulated to determine practice location in a given calendar year.
- A periodic (every 1–2 years) graduate survey of those who have given consent in the exit survey to be contacted for further study. Graduate surveys aim to answer specific research questions by collecting additional data directly from graduates that are unavailable in the tracking database, e.g. current scope of practice, patient populations served, suggestions on how the curricula may be improved to enhance future graduates' clinical competencies, etc.

Governance: The JCU tracking study was implemented in 2011, with ethical approval periodically obtained for 3-year periods from the JCU Human Research Ethics Committee. The process is managed by a single faculty member who administers and enters data for the exit survey, including identifying each new graduate AHPRA registration number each year, and obtaining practice location from AHPRA for each year. The faculty member also undertakes a graduate survey every 1–2 years – usually with a small advisory group of JCU academics associated with the specific research question(s) to be answered by that particular survey. The faculty member has a position dedicated to evaluating JCU medical school curricular activities, which includes the school's graduate outcomes, and has appropriate skills in database management, study design, survey design, quantitative and qualitative data analysis, and writing for publication. The JCU medical school does not provide dedicated funds to support the graduate tracking process.

Benefits and findings: Overall, the tracking study has measured progress in producing graduates choosing to practise in northern communities, as well as achieving a significant representation of graduates practising in medically underserved areas, with Indigenous peoples, and in the public health system. Using the three components in tandem (exit survey, tracking database of yearly practice locations, periodic graduate survey) allows the process to answer all potential quantitative and qualitative research questions related to graduate intentions at exit, later practice outcomes associated with the school's mission, and specific factors enabling or inhibiting these outcomes. For example, the exit survey has shown:

- JCU medical graduates are significantly more likely than other Australian graduates (National Health Workforce Dataset [NHWD]) to undertake their internship outside a metropolitan centre and to intend to choose generalist medicine careers (Sen Gupta et al., 2014; Woolley et al., 2019).
- JCU's selection process, its rurally focused curriculum supported by quality clinical training experiences in local hospitals, and the government's provision of sufficient locally available

intern places, have increased retention of interns across northern Australia (Woolley and Ray, 2019).

- Urban-origin JCU students intend to undertake periodic rural practice (locums, outreach clinics, etc.), while rural-origin students prefer more permanent rural practice. Thus, urban-origin JCU graduates may be a significant resource for non-permanent rural workforce (Woolley, 2019).
- The 6-year JCU medical curriculum has positively influenced the commitment of graduating students towards more socially accountable practice (Woolley et al., 2021).

The tracking study showed that:

- Early career (PGY1–7) JCU graduates' pattern of practice is significantly more regional, rural, and remote compared with other Australian medical graduates (NHWD data) (Sen Gupta et al., 2014).
- There are specific predictors of rural and remote practice (Woolley et al., 2014; Woolley, Sen Gupta et al., 2017; Sen Gupta et al., 2017).
- JCU's decentralized medical education model significantly increases rural recruitment and retention in local districts of workforce shortage (Woolley et al., 2016).
- JCU's selection process that takes into account rural-origin, local-origin and Indigenous Australian background in addition to high academic achievement does not negatively impact overall on the quality of graduates' clinical competencies (Ray et al., 2015).

Graduate surveys have showed that:

- JCU produces significantly more graduates with a generalist career focus (Woolley et al., 2019), compared with similarly experienced Australian medical practitioners (NHWD data).
- JCU produces significantly more graduates working in government-funded organizations, including Indigenous Australian health services, community health centres and other state-run primary health care (PHC) organizations (Woolley, Sen Gupta et al., 2018), compared with other Australian medical graduates (Medicine in Australia: Balancing Employment and Life [MABEL] survey data).
- The majority of JCU-trained generalists locate their practice in Northern Australia, but additional initiatives are needed to encourage specialists to train and later establish their practice there (Woolley et al., 2020).

Enablers and challenges: JCU's tracking process has been significantly enabled by having a faculty member capable of undertaking all aspects of the process from data collection to dissemination of findings; this has significantly reduced costs to JCU. An additional enabler is the availability of yearly practice locations for all graduates via the AHPRA database; this has allowed the database to be very complete and reduced costs associated with collecting these data. Prior to AHPRA data being available, JCU used yearly graduate surveys and social media to keep in touch with graduates to identify their practice location – a considerable investment in time and resources. Other enablers have been the availability of Australian medical graduate databases, such as MABEL and the NHWD, as comparison groups for JCU graduate outcomes, and a long-lasting personal connection of graduates to the JCU medical school that continues to provide a good graduate survey response rate.

However, the tracking process has barriers to long-term sustainability and some limitations. The key challenge is having only one faculty managing the process; if that staff member is lost, then the tracking process is at significant risk of ending. In addition, as further cohorts graduate, increasingly large numbers of individuals need to be tracked, putting significant pressure on one faculty member managing the process. As a result, practice location data are now entered only every 2–3 years. The tracking process also has the major limitation that graduate surveys only collect self-reported subjective data; thus, separate studies are needed to collect more “objective” data to answer certain research questions, for instance on the quality of graduates’ clinical competencies.

4.5.4 Tracking of students and graduates of the Northern Ontario School of Medicine, Canada

Overview: A multicohort and multimethod longitudinal tracking study designed to understand the impact that the selection criteria, medical education, and residency programmes have on students’ future practice choices.

Context: In Canada, medical students first complete a university degree before finishing 3 or 4 years of undergraduate medical education (UGME) at one of 17 medical schools. They then complete 2–5 years of postgraduate (PG) training in a medical school residency programme before they can be licensed for full independent medical practice. Further specialization requires additional years of residency training.

The Northern Ontario School of Medicine (NOSM) has a social accountability mandate to serve the health care needs of the people of Northern Ontario, Canada. NOSM offers a 4-year UGME programme and 2–5 years of PG residency training in anaesthesiology, family medicine, general surgery, internal medicine, orthopaedic surgery, paediatrics, psychiatry, and public health and preventive medicine.¹ NOSM also provides training opportunities in rural and Northern Ontario for those training to become medical physicists, physician assistants, dietitians, audiologists, occupational therapists, physiotherapists, speech-language pathologists, or pharmacists.

NOSM’s community engaged learning uses a comprehensive life-cycle approach that begins in high school, carries on through medical school, postgraduate training, and into practice (Strasser et al., 2018). For example, NOSM:

- Offers high school students an opportunity to experience the medical school and envision a career in one of the health professions, including medicine.
- Selects medical students who reflect the population of Northern Ontario (i.e. Indigenous, Francophone, rural, northern).
- Trains students and residents in a variety of facilities in over 90 communities in Northern Ontario.
- Offers education and training to licensed MDs to improve practice and maintain professional credentials.

¹ <https://www.nosm.ca/education/>

Methods: The objective is to understand how NOSM's selection criteria, medical education and residency programme set in the rural and underserved communities of Northern Ontario, affect the choice of a medical discipline, practice location, medical services and procedures, inclusion of medically underserved patient populations and practice structure (e.g. solo, group, interdisciplinary).

The study follows learners from entry into the UGME programme or PG residency programme and continues into independent practice. The study compares learners who experience NOSM UGME and NOSM PG training with those who experience NOSM UGME alone or NOSM PG training alone. Within these groups, the study also compares learners in family medicine with those in other specialties offered at NOSM. Every 5 years, outcomes are compared with graduates of other Canadian medical schools. Ethical approval is granted annually by the Research Ethics Boards of Laurentian University and Lakehead University, which serve as the dual host universities of NOSM.

Governance: The tracking study, multicohort and multimethod, was started in 2005 with NOSM's charter class of medical students and PG residents. The study was conducted from 2005 to 2019 by the Centre for Rural and Northern Health Research-Laurentian University (CRaNHR-Laurentian) (Hogenbirk, French et al., 2015). In 2019, responsibility for the tracking study was transferred to the Office of Institutional Intelligence, NOSM. For the first 12 years, the study was supported by funding from the Ontario Ministry of Health and Long-Term Care and has since been supported by NOSM. An advisory committee, formed in 2005, comprises NOSM faculty members and CRaNHR-Laurentian researchers. The tracking study research team reports annually to the Ministry of Health and Long-Term Care and to NOSM.

Benefits and findings: Some notable outcomes of the tracking study include adjusting and verifying the admissions process and analysis of the association between the educational path and practice location.

- **Admissions process:** The tracking study has helped modify admissions criteria to ensure appropriate representation of minority populations.
 - Indigenous people comprise 14% of the population in NOSM's service area of Northern Ontario, compared with 2% of the population in all of Ontario; it is a socially accountable goal of NOSM to encourage and select qualified Indigenous applicants. As a component of the tracking study, 10-year analysis of the admission process (2006–2015) found that only 7% of the student population was Indigenous (Mian et al., 2019). Changes made to the admission process as a result of this finding and other studies allowed NOSM to increase the intake of Indigenous students to 12% during 2016–2019.
 - The 10-year review confirmed that NOSM's student population was representative of the Francophone population, another prominent minority population in Northern Ontario.
- **Practice locations of NOSM graduates:** Tracking study results showed that in 2018, 92% of family practitioners (FPs) who completed UGME and PG medical education at NOSM stayed to practise in Northern Ontario (Woolley et al., 2020). By comparison, only 24% of NOSM undergraduates who went elsewhere to complete their FP residency training returned to practise in Northern Ontario and 54% of FPs who completed their UGME at another medical school before coming to NOSM to complete their PG training set up their practice in Northern Ontario. Approximately 30% of those who completed PG training in other specialties (e.g. anaesthesiology) were practising in Northern Ontario. These results from 2018 confirmed earlier work on the first three cohorts of family medicine graduates (Hogenbirk et al., 2016; Wenghofer et al., 2017).

- **Graduate achievements:** NOSM's selection criteria and medical education programme ensure that appropriate diversity in the medical student population and the quality of graduates are achieved simultaneously. The academic performance and licensing rate of NOSM's medical students meets or exceeds national averages, indicating that NOSM is producing qualified MDs (Strasser et al., 2019). The tracking study has allowed NOSM to confirm its admissions criteria for one minority group and modify it for another group to select students who are more representative of NOSM's service area population. Although findings have shown that a substantial proportion of NOSM trained physicians locate their practice in Northern Ontario, it has also shown that additional initiatives are necessary to encourage FPs to locate in rural areas of the region and that work is needed to bring other specialists (e.g. paediatricians) to establish their practice there. The study substantiates NOSM's contribution to the medical workforce in underserved areas. NOSM, in conjunction with government health workforce planning agencies, is developing or supporting various initiatives, such as the rural generalist pathway programme to increase the number of physicians in rural areas, increase access to medical care, and, eventually, improve the health of the people in Northern Ontario.

Enablers and challenges: The tracking study started with the first cohort of students admitted to the newest medical school in Canada and the first school founded with an explicit social accountability mandate. There was strong student participation right from the start. The independence of CRaNHR-Laurentian from NOSM was also considered to play a role in encouraging high participation and helped provide credibility to the study methods and results.

Response rates were typically 100% for the entry survey. However, these rates declined somewhat by graduation and were as low as 30% by the time students had completed their PG training (typically 2–5 years after graduation from medical school). Tracking was more difficult for students who had completed medical school at NOSM but had gone to another medical school for their PG training. Fortunately, organizations that license medical practitioners in Canada (regulatory colleges) also keep track of medical education and residency pathways, practice locations, and other practice and personal attributes of physicians they register. The tracking study was able to fill in some of the missing data with information in the public domain or data acquired with the specific permission of regulatory colleges.

This study initially received external funding from the Ontario Ministry of Health and Long-Term Care and was financially supported by NOSM in subsequent years. Nonetheless, funding remains a challenge given economic conditions and competing priorities within the medical school. The senior leadership at NOSM continues to provide strong support for the study and recognizes the importance of the tracking study in providing the evidence needed to monitor and evaluate its UGME and PG medical education programmes.

4.6 Conclusion

HRH tracking studies, particularly those with a longitudinal component, have strengths in promoting greater understanding of the impact of learner selection criteria and admission policies on the eventual deployment and of key aspects of education and training, such as community-based engaged and distributed learning, on practice intentions and eventual choice and, on population health. These studies can also address the issues of faculty selection and the equitable access to lifelong learning opportunities for faculty and graduates to address the evolving health care needs of the communities they serve. Longitudinal, intersectoral HRH data collection and analysis can help align, develop, and monitor the impact of policies and plans on the creation and maintenance of interprofessional teams with the right competencies to address people's health needs, wherever they live.

As an integral part of national health workforce planning, tracking studies can help guide intersectoral negotiations among ministries, government agencies and health education institutions. In addition to the schools' role in educating and training the health workforce, the tracking studies play a central role in ensuring a strong link between health worker education and training, planning, and population health outcomes.

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