Centre of Excellence in Teacher Education

Teacher Supply Demand: A Review of Literature

Background paper 7:
State of Teachers, Teaching and Teaching Education Report 2023
CETE: 2023

Citation: CETE. (2023). **Teacher supply demand: A review of the literature**. Background paper 7: State of Teachers, Teaching and Teaching Education Report 2023.
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Content

Abbreviations

DPE	Directorate of Primary Education
D-S	Demand - Supply
NTS	National Testing Service
PTR	Pupil Teacher Ratio
PTTR	Pupil–Trained Teacher Ratio
SDG	Sustainable Development Goals
STEM	Science, Technology, Engineering and Mathematics
TALIS	Teaching and Learning International Survey
TPD	Teacher Professional Development

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8. CETE (2023). **News coverage in Indian print media on teachers and teacher education January-December 2023**. Background research report 8: State of Teachers, Teaching and Teaching Education Report 2023.

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1. Introduction

Teacher quality has acquired global significance both for its perceived value of economic competitiveness among countries and the fact that teachers' salary constitutes the largest public expenditure within the education sector (Cochran-Smith, 2021; OECD 2019; Sayed et al., 2018). The focus on teacher quality has also been fuelled by research linking teacher quality to student achievement (Darling-Hammond, 2000; Hanushek, 2002; Organization for Economic Co-operation and Development 2005; World Bank 2010; McKinsey and Company 2007). Quantitative studies indicate that measures of teacher preparation and certification correlate strongly with students' achievement in reading and mathematics, both before and after controlling for student poverty and language status (Darling-Hammond, 2000). Luschei & Chudgar (2011) found limited evidence linking teachers' education and experience to fourth-grade students' mathematics and science achievement across 25 countries participating in the 2003 Trends in International Mathematics and Science Study, nor were these attributes found important for disadvantaged children, or in lower-income countries. The Teaching and Learning International Survey (TALIS) across 48 countries found that countries that fared consistently well in PISA supported teacher quality through improving intake quality in teacher education programmes, and offering an inquiry-based teacher education programme with structured lesson analysis and enactment in order to improve pedagogical practices (OECD, 2018).

Continuing professional development is considered important for maintaining teacher quality. Sustained, focussed and intense TPD programmes that provide hands-on work enhanced teachers' knowledge of the content and how to teach it and showed strong positive effects on students' conceptual learning (Darling-Hammond & Richardson, 2009). Research on effective professional development also highlights the importance of collaborative and collegial learning environments that help develop communities of practice (Darling-Hammond & Oakes, 2021). A meta-review of studies providing induction and support to newly qualified teachers has shown a positive impact on teacher commitment and retention, teacher classroom instructional practices, and students' gains on academic achievement tests (Ingersoll & Strong, 2011).

In many countries of the global South, most teacher education is a weak intervention to alter particular views regarding the teaching and management of diverse learners (Batra, 2014; Avalos, 2011; Tatto, 1996). Induction programmes and support for newly qualified teachers are either rare or non-existent (CL4STEM, 2023). In South Asia, many countries have created structures and processes for TPD, largely through external aid agencies but they remain ad-hoc and diffuse (Singh, Rind & Sabur, 2021; CETE, 2019). Large-scale research connecting teacher quality with students' learning is sparse and longitudinal studies on the impact of teacher education programmes are unavailable. However, studies in the region do indicate that initial teacher education and TPD have a limited impact on teachers' practice and students' performance (Sayed & Sarangapani, 2021; ABD, 2018). Analysis of data from a large-scale assessment of 2,100,000 students of grades 5 and 7 across 41,000 government schools in one state in India showed teachers' qualification, professional certification or experience had no significant correlation with students' performance. However, teachers' practices like preparing lesson plans, use of learning resources and flexible classroom organisation had a significant impact on students' performance in the common achievement test conducted by the state (Ramchand, 2008). A study by the World Bank reports poor content knowledge and teaching skills among teachers in Bangladesh,

India and Pakistan and the authors recommend stringent recruitment policies with performance-based pay structures to ensure accountability (Dundar et al., 2014).

Scholars question the unproblematic linking of teacher quality to subject knowledge or technical skill (Luschei & Chudgar, 2016; Humphrey, Weschsler, and Hough 2008), and the severe limitations of punitive regulatory mechanisms and its debilitating effects on equity and inclusion (Connell, 2009; Fullan, 2012; Darling-Hammond, 2021). While teacher qualifications are important, they cannot alone define what makes a "high-quality teacher" (Goodwin & Low, 2021:366). Fenstermacher and Richardson (2005) note that conceptualising teacher quality requires attention to the psychological, logical, moral, and humanistic aspects of teaching along with the politics of regulations. Teaching as an intellectual work involving ethical and affective components requiring pastoral care, especially for students from marginalised and disadvantaged communities (Connell, 2009). Current standards are unable to capture these complexities of teacher quality and by attempting to ascertain individual teachers' performance against standards and linking them to students' outcomes, miss out on the collective endeavour of education (CETE, 2022).

Teacher quality is the result of systemic reform and simultaneous attention to multiple factors, including recruitment, preparation, compensation and career advancement, continuing professional learning, and teacher leadership development (Goodwin, 2021; Darling-Hammond 2017). Whole schools are accountable for learning, rather than individual teachers, while at the same time, education authorities are accountable to the schools for making the desired learning outcomes possible (Sahlberg, 2010).

2. Recruitment and Retention of teachers

The recruitment and retention of good quality teachers are imperative for school systems (Santiago, 2002). One of the crucial steps towards recruitment is to establish a mechanism to assess the demand and plan the supply periodically (UNESCO, 1979). This section gives a brief review of the literature that analyses factors affecting teachers' demand and supply (D-S) in countries across the globe and summarises broad trends in managing D-S and how these determine the quality of teachers. The examples for the trends are chosen from across the globe but restricted by literature and policy documents available in English.

Economic labour market theory is largely used for managing the demand and supply of teachers. Systems for managing demand and supply (D-S) for teachers have been evolving from a focus on intake statistics, alternative sources of recruitment, variables influencing retention, and system adaptability for any abrupt change (William, 1979) to a conceptual framework with five inter-related components comprising of the demand for teachers, the potential supply of teachers, structure of the market for teachers, the teaching workforce and teaching quality (Santiago, 2002). While most of the need for teachers is met by continuing teachers, the demand for new teachers is affected by several factors including growth or decline in enrolments, student/teacher ratios due to policy changes or shifts in course or staff requirements, and the loss, or attrition of teachers from the previous year (Haggstrom, Darling-Hammond, and Grissmer, 1988). The supply of teachers is affected by government policies on recruitment, teaching qualifications and licensing and a multitude of factors including support structures and the general quality of an education system affect the market for teachers and aspirations for the profession, which have an implication on the quality of teacher supply (Guarino et al., 2006).

The same demographic, policy, social, and economic trends which drive the components of teacher demand in terms of student enrolments, class sizes, and teacher attrition also determine teacher supply namely, the number of available continuing and prospective teachers and the attractiveness of teaching jobs. State recruitment and retention policies being one of the key determinants of D-S, the rest of the section gives a brief overview of the literature on the trends and impact of policies to manage D-S in countries of the Global North, Africa, Asia and specifically India.

2.1 Trends in managing demand and supply of teachers

Reporting on teacher shortage in the United States, Garcia & Weiss (2019) find that the shortage is large and growing. They find the shortage even more acute in schools catering to poor neighbourhoods and point out that it affects the professionalisation of teachers and the reputation for teaching, perpetuating shortages. Another study that examined the effect of high-stakes evaluation systems on the supply and quality of new teachers across different states in the United States, reports that these accountability reforms reduced the number of newly licensed teacher candidates and increased teacher shortage especially in hard-to-staff schools (Kraft et al., 2020). A study that looked at policy change in the state of Texas which allowed alternate routes for licensing teachers found the supply of new teachers increased but there was a decline in salary for new teachers (Guthery & Bailes, 2023). The authors warn that alternative licensure programs may not be an efficient solution to respond to teacher shortages in the country.

England faces teachers' shortage, especially at the secondary level. Low enrolment in initial teacher education and increasing attrition are exacerbating the issue. A time-series analysis of official data and documents finds that teacher shortages are partly created by the policies which include a defective selection and school funding system, extending school-leaving age, and an increased number of small schools (See & Gorard, 2020). While in England, teacher career decisions are devolved to the school level, Scotland introduced an innovative teacher career structure in 2001 which has led to a more robust organization and management of teachers. This structure involves a single salary schedule, wherein qualified teachers get a fixed pay scale that automatically increases every year, after which teachers need to apply and qualify for promotion (Crehan, 2019). In Ireland, teacher education programmes have been aspirational and enjoyed good status but changes in policies based on international strategies have created a shortage of teachers, especially in secondary schools and a reduced number of applicants for teacher education programmes (O'Doherty & Harford, 2018).

Iceland faces a shortage of qualified teachers in rural and remote areas and distance teacher education appears to offer a solution as trends indicate the programme graduates prefer to take up teaching positions in their own neighbourhood (Bjarnason & Thorarinsdottir, 2018). Norway has set up national teacher pay structures and enforces rules for teacher appointment and the available data enable an estimation of supply and demand functions for certified teachers, which indicates that there is a shortage of certified teachers in schools catering to minority students (Bonesrønning et al., 2005). In Finland, teaching continues to be a prestigious and attractive profession and more recently have reported teacher shortages for kindergarten and special needs education (European Commission, 2019). An extensive review of the issues involved in the management of teacher demand and supply in Europe finds that in some countries a portion of teachers are not licensed and reports that available data make it difficult to measure teacher shortage which raises concerns of quantity and quality (Santiago, 2002). A more recent report across the entire European

Union, notes that several countries already face or are about to face shortages of teachers (France, Italy and Portugal report the largest shortages), either across grades and subjects, especially in STEM subject areas, or in particular geographical areas, or with specific competences to teach children with disabilities and from socioeconomically disadvantaged homes. In general many countries report teachers find it difficult to meet the diverse needs of students and the use of technology in classrooms. There is also a significant proportion of teachers aged 50 or plus in all the countries with the largest proportions in Italy, Bulgaria, Lithuania, Estonia, Greece and Latvia, especially in the secondary level (European Commission, 2019).

In Australia, there is a rising demand for teachers as the population of primary students is projected to increase over the next decade and teacher supply varies across Australian states and territories with some reporting an oversupply of generalist primary teachers, but a variable secondary workforce by subject areas. Rural and remote areas face shortages across levels and part-time employment of teachers is becoming more prevalent with a continued decline in proportion of male teachers (Weldon, 2015). The state of Victoria has a robust mechanism for forecasting teachers' data, through databases for teachers across early childhood, primary and secondary settings. This includes data on enrolment and placement from Victorian universities and other sources, along with the total registered workforce for keeping track of the supply side, and school enrolment and employment data adjusted for population growth in future years for projecting demand. It also annually measures the number of additional teachers required to meet anticipated changes in demand stemming from future policy and program change, school enrolment growth, and replacement demand associated with attrition from the teaching register (Victorian Department of Education and Training Report, 2020).

Many countries of sub-Saharan Africa face a demand for qualified secondary school teachers and education stakeholders need to be consulted to build consensus for policies to increase the supply and retention of teachers (DeJaeghere et al., 2006). A recent study finds teacher shortages of teachers in sub-Saharan Africa to be high with the number of teachers with minimum qualifications decreasing and rising numbers of contractual teachers (UNESCO, 2022). In South Africa, a recent study to project demand finds that the teaching workforce has to double by 2030 and with the National Development Plan target of universalising two years of preschool, demand for early childhood educators will be high. The study projects that the demand for teachers across levels will taper off beyond 2030, when universities may have excess training capacity (van der Berg et al., 2022).

A national survey in Israel reports a large turnover, mostly of teachers moving between schools, an insufficient supply of certified teachers of core subjects and a widespread practice of out-of-field teaching (Donitsa-Schmidt & Zuzovsky, 2016). China has seen a significant increase in the number of qualified teachers post the expansion of higher education in the 1990s. The country is also witnessing increasing feminisation of the workforce and largely low to lower-middle ability college graduates getting into teaching in a decentralized and competitive graduate labour market (Dai et al., 2022).

Systems to manage D-S of teachers do not necessarily exist in South Asia. Weak statistical practices and mismatches between different sources are common despite the adoption of information management systems (Jha et al., 2021). In India, state governments estimate demand based on pupil-teacher ratio and vacancies in schools. However, the actual recruitment number depends on the government sanctioning and filling up the vacancies which are usually long-drawn. Recruitment policies and deployment processes remain quite

opaque in most states (Ramachandran et al., 2018). Our previous report on the State of Teachers and Teacher Education estimated a deficit of over 1 million teachers (at current student strength) which is likely to increase, given the shortages of teachers in certain education levels and subjects such as early childhood education, special education, physical education, music, arts, and curricular streams of vocational education (UNESCO, 2021). The rest of the section describes the challenges of teacher recruitment and deployment in South Asia as reported in the available literature.

2.2 Ensuring Quality

Most countries in the region have mandated professional qualifications and/or qualifying exams (Ramchand, 2021). In the past decade, Pakistan has been attempting to bring in merit-based recruitment, introducing a test by the National Testing Service (NTS) and most provinces have mandated a professional education degree with some like the Punjab region introducing a Master's degree in education and subject specialisation for recruitment in secondary schools (Alam, 2015). In Sri Lanka, recruitment decisions are jointly made between the Ministry of Education and the provincial public commission. There are two ways to enter the system as a teacher. One is entry through the Provincial Councils (through Public Service Commission) requires a Bachelor's degree for basic eligibility; the selection is through a screening test and interview. The Ministry of Education recruits teachers with a General Certificate of Education as trainee teachers who undergo a 3-year diploma in teaching in the government teacher training colleges, known as National Colleges of Education (Asian Development Bank, 2017). Bangladesh nationalised all private schools in 1973, following which the responsibility of the management of teachers (recruitment and placement, transfers, and in-service training) was delegated to the Directorate of Primary Education (DPE) for primary school teachers and the Directorate of Secondary and Higher Education for secondary school teachers (BEPS 2002). In India, apart from the mandatory teaching diploma (for elementary schools) and degree (for secondary schools), teacher eligibility tests are conducted by every state and at the national level for new recruitments.

But the problem of contractual teachers continues in South Asia with states opting for contractual appointments as a low-cost solution ensuring increased availability of teachers within a short span (Palau, 2012; Lhaden, 2016; UNESCO, 2014; Aturupane & Shojo, 2012). A few countries in South Asia recruit teachers from other countries to offset shortages. Bhutan has had a history of recruiting teachers, especially from India in the 1960s when it began modernising its education system, but has since become self-reliant in the supply of teachers (Royal Government of Bhutan, 1999). Maldives depends heavily on the recruitment of foreign teachers (Villa College, 2022). In India, contract teachers have comparable educational qualifications to full-time teachers but are paid much less, leading to discontent. While some states hire teachers initially on contract, they have a defined career path wherein they are absorbed as full-time teachers in the system in a given number of years (Ramachandran et al., 2016). Another worrisome issue is that the special residential schools started by the government to address social inequality have teachers on contract which affect the quality of education in those schools (Ramachandran, 2023).

2.3 Bringing in Transparency

Political influence in recruitment and deployment of teachers in the region has been noted in literature (Jha et al., 2020) which has resulted in skewed distribution of teachers in urban areas (Dundar et al., 2014). Despite clear policies, the use of quotas by politicians in Pakistan has resulted in patronage and graft (Mahmood, 2014). Irregularities in recruitment and other teacher management processes were also noted across many states in India

(Ramachandran et al., 2016). Several countries have adopted technology for managing the recruitment and deployment of teachers. This has been introduced to make the process more efficient, transparent and to avoid political influences in recruitment. One of the best examples of a technology-based solution for teacher deployment and transfer in India comes from the state of Karnataka which has legislated technology-enabled recruitment, deployment and transfers. The entire process is based on the PTR of schools and subject-specific vacancies with teachers exercising their choice within these parameters (Jha et al., 2016). This is not true for all Indian states with no clear process for assigning schools to newly-recruited teachers (Ramachandran et al., 2017). Bhutan has shifted to an online transfer application system since 2019 and teacher deployment has been decentralised and managed at the provincial level. The recruitment process is undertaken based on the demand by the Ministry of Education to decide the number of teachers to be trained under the Royal University of Bhutan. The successful candidates are recommended to the provincial Education Officer, who in turn hires them for schools based on vacancies and subject specialisations (Lhaden, 2016).

2.4 Ensuring diversity in the teaching workforce

Deployment and redeployment are critical issues affecting teacher placement location. In almost all countries across South Asia, the number of teachers working in urban areas is higher than in rural areas. Jha et al., 2021). A major difficulty for the countries in this region is the presence of teachers in rural, remote areas. In some countries like India, Nepal, and Pakistan, additional financial and nonfinancial incentives entice teachers to take up positions in difficult terrains and remote areas. Bhutan and some states in India offer special allowances (e.g., hill allowance) for this purpose (Jha et al., 2016). Often, contract teachers are hired in areas where it is challenging to retain permanent teachers (e.g., in Bhutan, Afghanistan, Nepal, and the Maldives) and in most cases, are denied the opportunity to transfer elsewhere. However, India (e.g., Karnataka and Gujarat), Myanmar, and Sri Lanka open transfer opportunities after a few years of service. Myanmar allows teachers assigned to remote government schools to apply for transfer after one year of teaching. The provincial governments of Sindh and Punjab in Pakistan are also trying to rectify the skewed distribution of teachers by introducing transparent and efficient transfer policies. Sri Lanka has attempted to address challenges in deploying teachers to rural schools by assigning newly recruited teachers to first serve in these schools for a fixed term, providing cash ‘hardship’ allowances and housing, and accelerating promotion. But the hardship allowance values are modest; the disbursement of allowances is irregular or unfair; the quality of offered housing is poor; faster promotion is not accompanied by an appreciable jump in position, prestige and pay (Raju, 2017).

Low numbers of female teachers at the secondary level in some of the countries of the region has an adverse impact on girls’ enrolment and retention (Jha et al., 2021). In Bangladesh, differential criteria for male and female applicants are attracting more female teachers into the education system and safe housing in Bangladesh encourages women to teach in rural areas (UNESCO, 2014). Pakistan, too, has introduced similar incentives for female teachers. Female teachers in Myanmar opt out of teaching in remote areas because of long distances, scarcity of food and danger to their lives (Myo, 2018). Nepal’s Education Act 2002 states that while undertaking teacher placement and transfers, female and physically challenged teachers are not to be placed in unsuitable locations. Teachers in remote areas need at least five years of service before applying for transfers, while teachers in non-remote areas need seven years before applying for transfers in Nepal (Jha et al.,

2021). In some states in India, the number of ST and SC candidates qualifying remains low, leading to high vacancies in the reserved category (Ramachandran et al., 2017).

3. Summary

Teacher shortages is common across levels (UNESCO, 2022). In countries of the global north, the UK (See & Gorard, 2020; O'Doherty & Harford, 2018) and in many countries of Europe (France, Italy and Portugal report the largest shortages) (Bjarnason & Thorarinsdottir, 2018), report shortage of STEM teachers at the secondary level. Across Europe, there is also a shortage of kindergarten teachers and special needs education (European Commission, 2019). The United States faces teacher shortages in English as a Second Language, Mathematics, Science and Special Education (Sutcher et al., 2019). The reasons for teacher shortage range from policies such as mandating early childhood education (van der Berg et al., 2022), to high attrition levels which have been traced to salary and deployment issues (Guthery & Bailes, 2023), performative cultures of teacher accountability (Rivas & Sanchez, 2022; Kraft et al., 2020) and burn-out (Chang, 2009), to an ageing teacher population (European Commission, 2019). Teacher shortages is especially acute in rural and remote areas and schools catering to marginalised students in the USA and Australia (Garcia & Weiss, 2019; Weldon, 2015). Also, large numbers of teachers are not teaching in the subject domains they are qualified in, indicating that even if teachers are deployed, they are not effective (Nguyen et al., 2020).

One of the crucial steps towards addressing teacher shortage is to establish a mechanism to assess the demand and plan the supply periodically (UNESCO, 1979). Some states have taken a laissez-faire attitude for managing teachers' supply or deployment and let markets decide (Guarino et al., 2006), and the evidence seems to indicate that where the state has evolved policies and structures, equity concerns are better served (Sutcher, Darling-Hammond, & Carver-Thomas, 2019). However, without adequate financial commitments and accompanying structures, policies are legislation remain ineffective (Guarino et al., 2006). Research on teacher recruitment and retention indicates that productive policies focus on both enhancing the supply of qualified and diversified workforce, targeting specific needs and locations through subsidies and improved working conditions, and providing adequate, relevant opportunities for professional development and career pathways (Luschei & Chudgar, 2016; Santiago, 2002). Countries like Finland and Singapore with such robust policies do not face teacher shortages (Darling-Hammond, 2022).

In the global South, many countries face acute teacher shortages. High birth rates in some countries of Africa and Southern Asia mean that school-aged populations are rapidly increasing, requiring more budget provisions for additional teachers (UNESCO, 2022). Currently, with limited budgets for education, several countries in Africa and Asia have lowered entry qualifications and have created a parallel cadre of contract teachers often undertrained, underpaid, inexperienced teachers hired locally on a contract basis, negatively impacting educational equity (Chudgar, Chandra, & Razzaque, 2014). In South Asia, even while mandating professional qualifications and/or qualifying tests (Ramchand, 2021), the problem of contractual teachers is acute in the region, with states opting for contractual appointments as a low-cost solution ensuring increased availability of teachers within a short span (Palau, 2012; Lhaden, 2016; UNESCO, 2014; Aturupane & Shojo, 2012). In India, contract teachers have comparable educational qualifications to full-time teachers but are paid much less, leading to discontent (Ramachandran et al., 2018). Another worrisome issue is that the special residential schools started by the government to address social inequality

have teachers on contract which affects the quality of education in those schools (Ramachandran, 2023).

Pupil to teacher ratio is another indicator of quality and reflects teacher shortages. The UNESCO global monitoring report uses the pupil–trained–teacher ratio (PTTR), to exclude unqualified teachers. In sub-Saharan Africa, the ratio is 55:1 with some countries like Chad (89:1) and Sao Tome and Principe (114:1) reporting high PTTR. The ratio for South Asia is 38:1 with wide regional variations. The PTTR for Bangladesh (59:1) and Pakistan (62:1) is high and the average for India is 29:1, which again differs widely across the states of India and between rural and urban regions. By contrast, the PTTR for most countries in the global North is 15:1, reflecting the potential for teachers to provide more time to support their students' learning (UNESCO, 2022).

Systems to manage D-S of teachers do not necessarily exist in South Asia. Weak statistical practices and mismatches between different sources are common despite the adoption of information management systems (Jha et al., 2021). In India, state governments estimate demand based on pupil-teacher ratio and vacancies in schools. However, the actual recruitment number depends on the government sanctioning and filling up the vacancies which are usually long-drawn. Recruitment policies and deployment processes remain quite opaque in most states (Ramachandran et al., 2018). Our previous report on the State of Teachers and Teacher Education estimated a deficit of over 1 million teachers (at current student strength) which is likely to increase, given the shortages of teachers in certain education levels and subjects such as early childhood education, special education, physical education, music, arts, and curricular streams of vocational education (UNESCO, 2021). It remains to be seen whether the signatories of UNESCO's Sustainable Development Goals will be able to meet the SDG 4 target to increase the number of qualified teachers by 2030 (UN, 2015).

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