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ORIGINAL RESEARCH ARTICLE

Are Economic Evaluations of Task Shifting Too Narrow in Focus? A Rapid Review

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Abstract

Background and Objectives Task shifting between different cadres of health worker has been proposed as an approach to address workforce shortages. Whether such reallocation is a useful strategy for a health system depends on the potential costs and consequences. Too narrow a focus has implications for population health as resources could be incorrectly directed towards inefficient activities owing to important costs and/or benefits being omitted from the evaluation. We aim to identify the key issues when evaluating the value for money of task shifting and review the applied literature to determine whether it is fit for purpose.

Methods We developed an a priori logic model of task shifting and searched five databases (MEDLINE, Embase, EconLit, Social Sciences Citation Index and CEA Registry) for economic evaluations of task shifting published between 2014 and 2024. We performed forwards and backwards citation searching. We considered the scope of the evaluations with respect to the ability to capture key costs and outcomes of task shifting from the logic model. Reporting quality was assessed using the Consolidated Health Economic Evaluation Reporting Standards (CHEERS) checklist.

Results The rapid review identified 26 studies for inclusion covering 16 countries. Studies evaluated task shifting to community health workers and lay health workers as well as from doctors to radiographers, non-physician clinicians and nurse-midwives. The studies included health costs and outcomes but few included changes in the capacity of the workforce to undertake tasks, access, waiting times, productivity, burden on other staff, patient satisfaction, patient productivity and health equity concerns. There was a predominance for cost-effectiveness analysis to be used to assess the value for money of task shifting but the literature did include a cost-benefit analysis, a cost-consequence analysis and an extended cost-effectiveness analysis.

Conclusions The majority of studies identified a range of costs and consequences that may only be appropriate for resource allocation under the strong assumption that all longer term costs and consequences would be unaffected by the task shift.

Key Points for Decision Makers

The existing literature informed an a priori logic model to make explicit the array of short-, intermediate-, and long-term costs and consequences that may be important to the value proposition of task shifting.

Our pragmatic review of full economic evaluations of task shifting revealed 26 studies covering a broad range of countries, tasks and health workers, and a narrow range of costs and consequences when compared with those described in the logic model.

The logic model developed in this study and the applied economic evaluations provide a useful resource for those conducting economic evaluations to clearly outline the scope of the analysis and any assumptions regarding omitted impacts.

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1 Introduction

Globally, there is a health workforce shortage [1, 2]. In many low- and middle-income countries (LMICs), the shortage is critical, exacerbated by increased demand from the rising burden of non-communicable diseases and communicable disease epidemics, and reduced supply from the migration of the health workforce to high-income countries [3]. The crisis is such that increasing health workforce recruitment has been explicitly outlined in the United Nations sustainable development goals (Goal 3.c) [4].

Task shifting has been proposed as an approach to address the health worker shortage. It typically involves reallocating tasks (or care) from health workers with higher levels of training to those with lower levels [5, 6]. There is an existing body of literature evaluating the effectiveness of task shifting [6, 7]. The literature has also focused on whether the tasks can be delivered with lower costs. A systematic review found that, in the majority of studies, task shifting could result in potential cost savings in LMICs, although it is unclear where the savings would occur, and whether the task shifting resulted in efficiency improvements, (defined as a reduction in cost per input/process, output or outcome) [8]. The focus on potential financial cost savings risks telling only part of the story as there may be other effects of task shifting such as those on healthcare quality or workforce satisfaction. Further, it does not address the forgone benefits from the health resources used to deliver the task.

Economic evaluation offers the means of transparently assessing the value for money of potential healthcare decisions by capturing the associated costs, benefits and foregone benefits [9]. There is, however, limited evidence on whether implementing task shifting represents value for money or improves population health [10, 11]. This paper aims to advance the use of an economic evaluation in task shifting by developing a logic model of the potential costs and consequences and then examining previous economic evaluations and assessing how well they captured the impacts.

2 Overview of Task Shifting

To consider the potential costs and consequences, we first present the different types of task shifting. The European Commission [6] presented a taxonomy based on a framework by Sibbald et al. [12]. It categorises task shifting into enhancement, substitution/delegation and innovation. A diagram of the taxonomy is shown in Fig. 1.

Enhancement refers to the enhancement of the skills of a particular health worker, illustrated in Fig. 1 through the addition of a new skill or task (A4) to Cadre A. An example is pharmacists' prescribing in the management of chronic diseases [13–15]. Substitution/delegation refers to the movement of a task from one cadre to another, illustrated in Fig. 1 through Cadre A delegating task A3 to Cadre B. It is intrinsically linked to enhancement as the cadre undertaking the new task have enhanced their skills. An example of substitution/delegation is task shifting of cardiovascular risk factor management from physicians to community health workers (CHWs) [16]. Innovation refers to the development of a new cadre or the introduction of a technology to undertake a task, depicted in Fig. 1 as the new cadre, Cadre C, taking on task B3. An example of an innovative task shift is the introduction of physician associates into the workforce [17]. Combination denotes that the different types of task shifting need not occur in isolation. An example is nursing assistant-led treatment of patients with depression and co-morbid hypertension and/or diabetes mellitus using digital interventions [18].

3 Methods

In this section, we briefly discuss the previous literature conceptualising the impacts of task shifting. Drawing on these, we develop a logic model of the potential costs and consequences from task shifting. Finally, we conduct a rapid review of the applied literature.

3.1 Development of the Logic Model

To aid visualisation and understanding of task shifting for the purpose of an economic evaluation, we developed an a priori logic model. We considered this a useful method to capture important costs and consequences and help to understand whether previous economic evaluations were appropriate. The model comprises the inputs, outputs and outcomes (or consequences) of task shifting, which in turn comprise a number of domains. Inputs were considered the resources required for implementation, outputs were considered the actions taken to ensure successful implementation and outcomes were considered the results or changes resulting from the task shift.

The domains included in the model were initially influenced by previously published task shifting logic models and frameworks. Previous frameworks communicating the complexities of task shifting have focussed on the purpose, opportunities and criteria for implementing task shifting [19] and the key elements required for success [20]. Disease-specific task shifting requirements have also been described [21, 22] with one framework outlining limited outcomes of

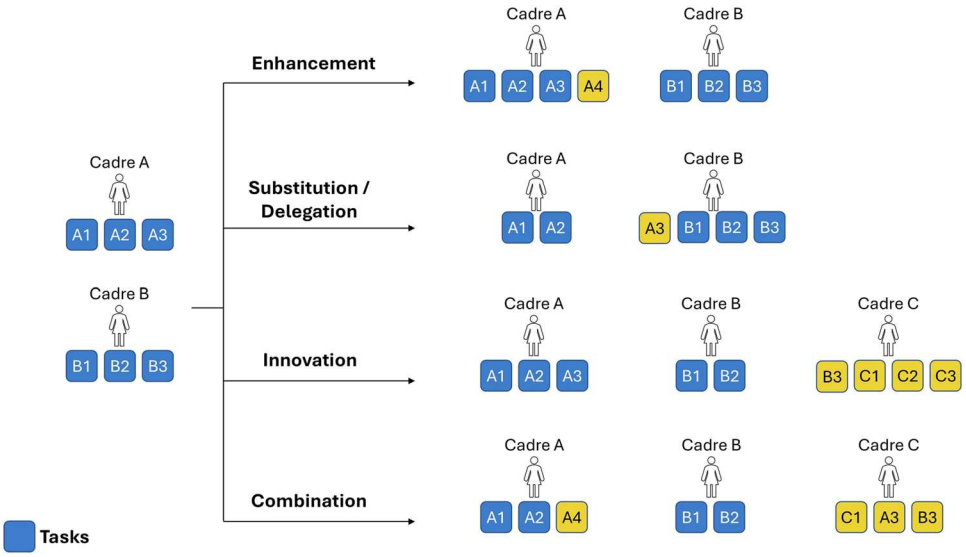

Fig. 1 Diagram of task shifting. This diagram is based on the European Commission's taxonomy of task shifting. [6] The letters of the tasks correspond to those that were previously being done by the cadre. For example, those labelled A1, A2 and A3 were originally being conducted by Cadre A. The blue tasks denote those that were already being conducted by the cadre and the yellow tasks denote those that have been reallocated following the task shift. For example, following a 'substitution/delegation' task shift, Cadre B will conduct their original tasks B1, B2 and B3 as well as their new task A3

task shifting in the form of health outcomes, satisfaction and cost savings [23].

Orkin et al. [19] described the conditions required for task shifting such as sufficient human resources, the ability to train health workers and the social acceptability of the task shift. Orkin et al. [19] also described the outcomes of task shifting as the opportunity to redistribute responsibilities, the delivery of care by those with close relationships with the community, increasing scale up and the potential for changes in existing hierarchies.

Leong et al. [20] outlined the elements required for task shifting and included financing, organisational support, training and competency, and patient preference. Robertson et al. [21] provided a framework for the inputs required to train, practice and maintain task shifting of surgical care in the coronavirus disease 2019 (COVID-19) pandemic and included training and supervision. Sevene et al. [22] included the importance of the regulatory environment, the need for training and supervision to ensure the preparedness of the new cadre, and the acceptability of the task shift to the community and management in their analysis of task shifting to CHWs. Aurizki and Wilson [23] described a framework for nurse-led task shifting in primary care and listed inputs as training and supervision and outcomes as health, satisfaction and cost impacts.

Following guidance from the previously published frameworks, we used the applied and conceptual literature to consider other aspects of task shifting that could be included in our logic model. The literature was identified through examining reference lists of the frameworks and conducting targeted searches on emerging themes and key terms. The domains and the literature underpinning the described domains are provided below.

Inputs include human resources, technology, management, training and regulation. Human resources required to undertake the new task may include health workers, patients and carers and may be supplemented by technological inputs [6, 24]. Task shifting requires adequate supervision and training programmes [5, 25], as well as regulatory frameworks and the involvement of educational institutions to oversee training, set the rules, manage credentialing, limit entry to the profession and foster a collaborative attitude across cadres [26, 27]. Community engagement may also be required to ensure new cadres undertaking the tasks will be accepted by the public and patients [28, 29]. The outputs of the logic model represent the product of the inputs such as the adequate supply of health workers, patients or carers trained to deliver the task as well as appropriate education curricula, policies and governance, management, administration and mentorship for the health workers.

The goal of task shifting may be to reduce disease burden and mortality [5] but there are different mechanisms through which this is achieved. Task shifting can result in an increased capacity to deliver healthcare, leading to an increase in the supply of health services. Examples of the short-term increase in supply from task shifting were experienced during the COVID-19 pandemic in which existing cadres undertook COVID-19 testing, surveillance, communication and care management [30]. Task shifting can expand access to care [31–33], impact waiting times [5, 34, 35], and improve efficiency and health system productivity [6, 8, 36, 37]. However, there may be opportunity costs associated with shifting tasks to workers of a limited number, meaning reductions in the supply of other tasks may result. Similarly, freed resources from those who have tasks taken away from them may increase the supply of other tasks.

There may also be a complex picture of increasing or decreasing worker satisfaction owing to the changing roles and workload from task shifting [14, 28, 38–41] and a correspondingly complex picture regarding the consequences for staff retention [39, 42]. The increased burden on other staff who may have new supervisory responsibilities [43] and the wage shift resulting from permanently altered roles may represent consequences to health workers and their supply in the long run.

Task shifting may also impact patients through a change in patient satisfaction when interacting with cadres of differing training, skills, knowledge, cultural background and workload [6, 28, 37, 39, 44–47]. Impacts on the quality of care, readmittance, complication rates and ultimately patient health outcomes can result from task shifting [6, 48–53]. Improvements in coverage and health outcomes resulting from task shifting provide a potential means to protect households from out-of-pocket (OOP) health expenditure [54] and to improve their productivity or labour market outcomes [55]. In the long run, there may be impacts on net population health and health equity. Changes in the costs of training cadres in new clinical and supervisory skills, and costs associated with the delivery of health services may result [56]. Task shifting can also address skill-mix imbalances [57] and may permanently alter the skill mix in the long term.

The logic model was discussed at an online workshop hosted by the University of York in September 2024. A list of experts was compiled by the authors and invitations were distributed. The workshop included representative from the UK, South Africa, Brazil and India, and comprised a diverse range of expertise and affiliations. Participants were involved in discussion of the logic model as well as a group exercise to consider what aspects should be included in a logic model of task shifting. The findings from the workshop were used to help refine the logic model through validation of the existing domains and by providing thoughts on absent domains.

3.2 Review Methods

The rapid review was based on principles of good practice of conducting a quality systematic review. This included determining the scope, identifying the inclusion and exclusion criteria, a systematic database search, synthesis of the included studies and a quality appraisal [57]. We used the Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) 2020 [58] checklist and the updated recommendations for the Cochrane rapid review methods guidance [59] to aid reporting, the results of which are in the Electronic Supplementary Material (ESM).

3.2.1 Data Sources

A search strategy was designed in Ovid MEDLINE by an information specialist (HF) in consultation with the review team. The search strategy from a previous systematic review by Seidman and Atun [8] was used to develop the search strategy and included terms for task shifting as well as synonyms for 'task', 'shift' and 'health worker' with many individual cadres named, for example 'doctor'. Alternative terms such as 'skill mix' were also included. Text word searches for terms appearing in the titles, abstracts and keywords of database records were included in the strategy alongside searches of relevant subject headings. The MEDLINE strategy was adapted with relevant subject headings (controlled vocabularies) and search syntax appropriate to each resource. Search filters for economic evaluations were used where applicable. Studies were limited to English language and from 2014 to current. No geographic restrictions were applied to the searches. See the ESM for the full search strategy. The results of the databases were deduplicated in EndNote 21.

The following databases were searched on 26 March, 2024:

1. MEDLINE® ALL via Ovid (1946 to 25 March, 2024);
2. Embase via Ovid (1974 to 25 March, 2024);
3. EconLit via Ovid (1886 to 21 March, 2024);
4. Social Sciences Citation Index (SSCI) via Web of Science Core Collection (1956 to present); and
5. Cost-Effectiveness Analysis (CEA) Registry via https://cear.tuftsmedicalcenter.org/ (inception to present).

The eligibility criteria described through the population, intervention, comparator and outcome as well as any additional study considerations are shown in the PICO in the ESM. Any economic evaluation of a medical technology may implicitly involve task shifting; however, our inclusion criteria were limited to studies in which it was explicit that a task had been fully or partially reallocated from one cadre/technology to another.

Given the heterogeneity of potential task shifting activities, forwards and backwards citation searching was conducted from a list of 29 pearls identified from the original database search based on a preliminary assessment of meeting the criteria for inclusion. The following sources were searched on 4 June, 2024 for both forward and backward citations of the 29 papers listed in the ESM:

Web of Science Core Collection via Clarivate Analytics.

Citations were added to EndNote 21 (Clarivate Analytics) and deduplicated. Records published before 2014 were removed to match the inclusion criteria. Grey literature was not part of the inclusion criteria.

3.2.2 Study Selection

One reviewer (PM) independently screened the titles and abstracts of the studies identified in the database search. The full texts of eligible studies based on title and abstract screening were assessed for eligibility by one reviewer (PM) and then data were extracted to inform the synthesis.

3.2.3 Data Extraction

Data were extracted by one reviewer (PM) on the setting, cadre, task being shifted, the type of task shifting as defined by the European Commission's taxonomy (see above) [6], country, population, effectiveness evidence informing the economic evaluation, whether changes in access/coverage were included and the results of the economic evaluation. Methodological aspects extracted include the evaluative framework, the perspective, including key resource use and health outcomes captured as well as any non-health outcomes. The full data extraction form can be found in the ESM. Reporting quality of the studies was assessed through the use of the Consolidated Health Economic Evaluation Reporting Standards (CHEERS) checklist 2022 [60].

3.2.4 Data Synthesis

A descriptive approach to synthesis was adopted to group key discussion points based on the identified methods and the types of interventions evaluated. Information on the aspects of the logic model (see Fig. 2) was extracted to map which outcomes of the logic model had been included in the economic evaluation.

4 Results

The resulting logic model can be seen in Fig. 2 comprising the domains of inputs, outputs and outcomes. The logic model is not intended to be exhaustive but to capture key issues of consequence.

The database search yielded 2791 results, reduced to 2379 after de-duplication. The titles and abstracts were screened and a total of 92 studies met the criteria for full text screening. Of these, 18 papers met the inclusion criteria and, in addition, 20 systematic reviews were identified with the included papers in each also checked. Through this process, two additional economic evaluations were identified. The forwards and backwards citation search returned a total of 612 records after deduplication against the original EndNote library. This yielded 34 studies for full text screening of which six met the criteria for inclusion. In total, 26 studies

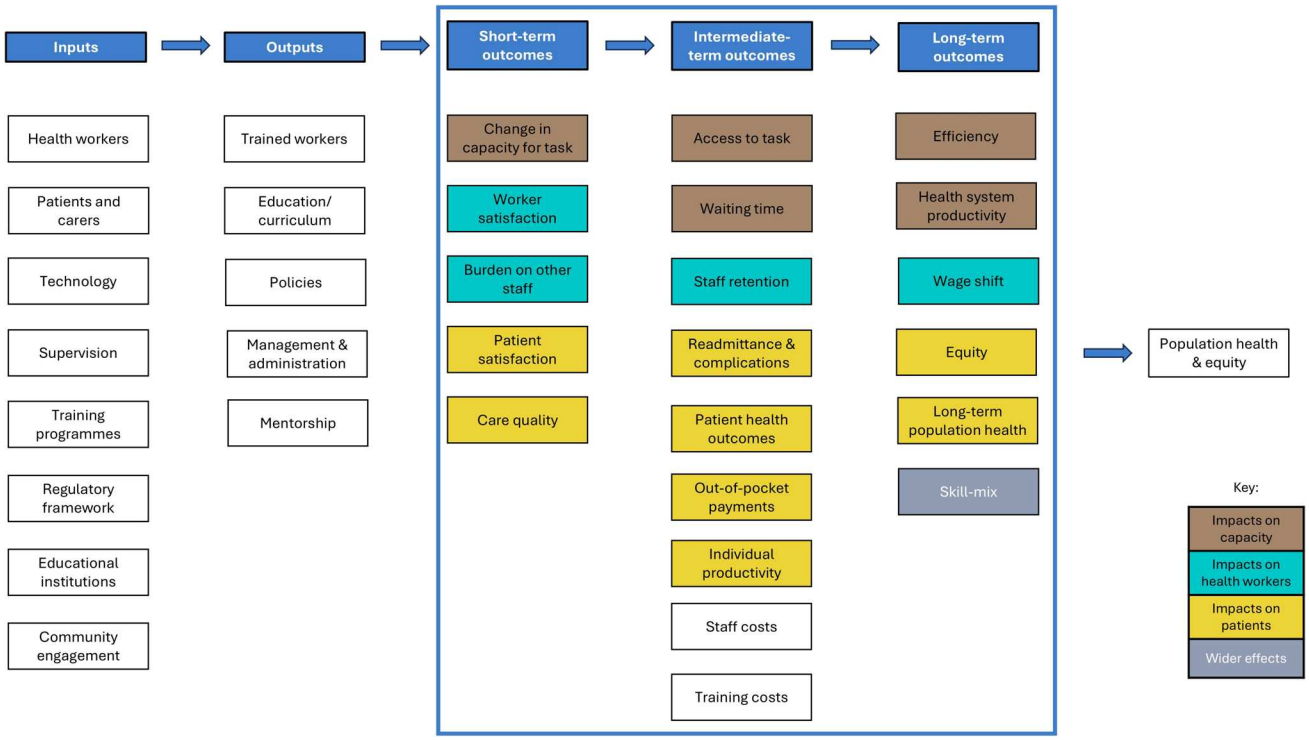

Fig. 2 Logic model of task shifting

formed the results of our rapid review, which can be seen in the PRISMA diagram [58] in Fig. 3.

4.1 Summary of the Evidence

The economic evaluations comprised 23 CEAs [61–83], one cost-benefit analysis [84], one cost-consequence analysis [85] and one extended CEA [86]. Of the 26 studies, one study [64] based its economic evaluation on three countries: India, Pakistan and Mozambique. Seven economic evaluations are set in low-income countries: Ethiopia [70, 73, 86], Uganda [61, 65], Malawi [67] and Mozambique [64]; and 12 are in middle-income countries: Ghana [62, 82], Kenya [74, 77, 84], Zambia [68], Zimbabwe [71], Pakistan [64, 69, 75], South Africa [78] and India [64]. The seven studies set in high-income countries are in the UK [63, 83, 85], USA [72], Canada [76], Sweden [79] and the Netherlands [81].

Five studies evaluated shifting tasks to CHWs [61, 68, 70, 75, 77] and three evaluated lay health workers [69, 71, 80]. The tasks shifted to CHWs and lay health workers included testing for communicable diseases [61, 68, 77, 80], screening for severe acute malnutrition [75] and delivering mental healthcare [69–71]. Five studies considered task shifting in the hospital setting [62, 63, 67, 79, 81], of which four evaluated shifting from medical doctors to radiographers [63], non-physician clinicians [67, 81] and nurse-midwives [79]. Three studies evaluated task shifting of surgical care from trained surgeons to alternative cadres [62, 82, 86].

The outcomes of the evaluations were generic measures of health including quality-adjusted life-years [QALYs] (n = 8) [63, 66, 70, 72, 76, 81, 83, 85] and disability-adjusted life-years [DALYs] (n = 6) [62, 65, 67, 77, 78, 82]. In two cases, constituent parts of the DALY were reported as outcomes: years of life lost as a result of pre-eclampsia [64] and years of life lost because of disability as a result of mental disorders [71]. Six studies evaluated task shifting of HIV interventions [61, 74, 77, 78, 80, 84], of which four reported disease specific outcomes including the number of persons newly diagnosed with HIV [61], the change in HIV incidence [84], the number needed to treat [74] and HIV infections averted [77].

In four studies [62, 63, 72, 82], task shifting was dominant, that is, it generated more health outcomes at a lower cost. In one study by Bone et al. [64], the task shifting of pre-eclampsia care was dominated by existing care, meaning it generated less health and resulted in a higher cost. Five studies did not use generic measures of health for their CEA [61, 68–70, 75]. The cost-benefit analysis conducted by Galárraga et al. [84] reported a benefit-to-cost ratio of 1.13, meaning the monetary value of the benefits outweighed the monetary value of the costs by 13%. The remaining 14 CEAs [65–67, 71, 73, 74, 76–81, 83, 85] reported incremental cost-effectiveness ratios and the extended CEA [86] reported the

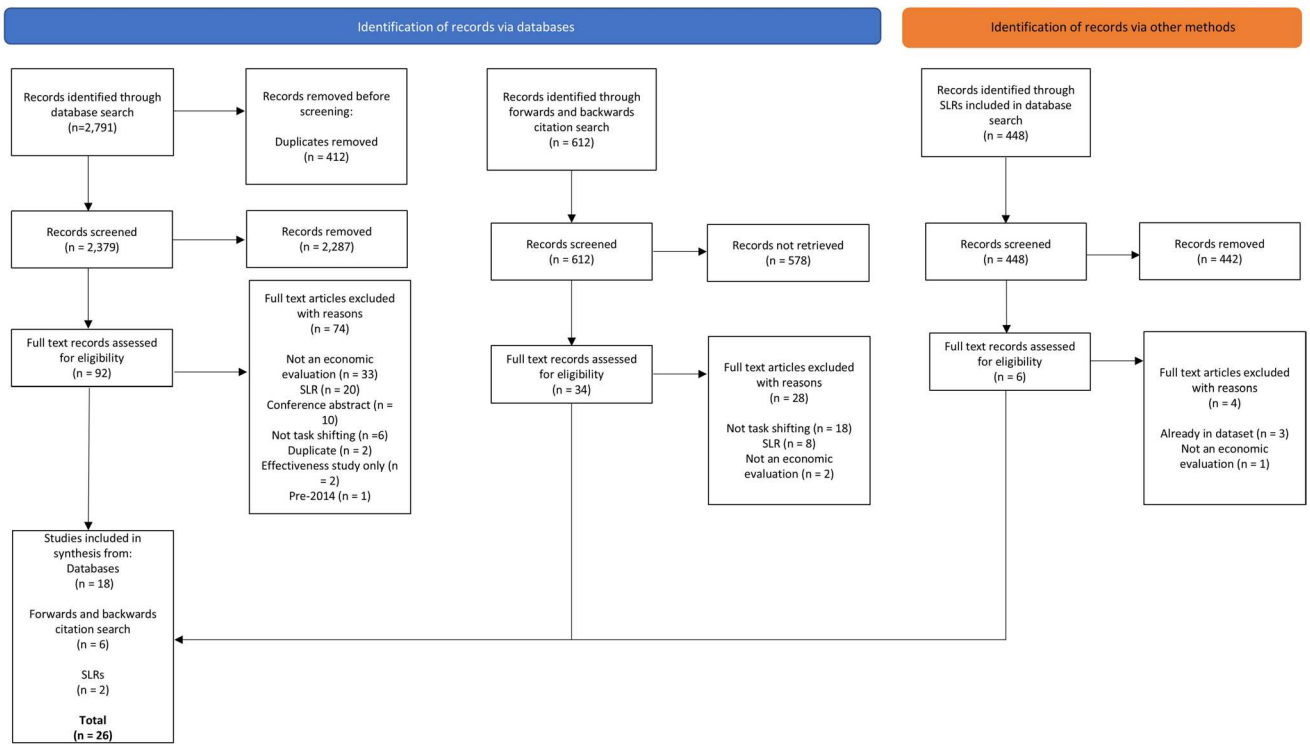

Fig. 3 Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) flow diagram. *SLR, systematic literature reviews.*

distribution of deaths averted and cases of impoverishment averted. For a full summary of the results, see Table 1.

4.2 Categorisation of the Evidence Through the Logic Model

Figure 4 summarises which of the costs and consequences in the logic model were included in the economic evaluations. Of the short-term outcomes, eight studies (31%) formally captured a change in capacity [61, 68, 72, 73, 76–78, 82]. Three studies included the capacity to conduct diagnostic tests [61, 68, 77]. Jayasekera et al. [72] captured the change in the treatment capacity of vocational nurses and Thet Lwin et al. [82] considered the increase in number of inguinal hernias that could be performed, whereas Sharma et al. [78] estimated the change in clinic volume with task shifting. Only one study by Johns et al. [73] captured any burden of task shifting falling on other staff by capturing the costs of supervision of the new cadre on the existing staff. Patient satisfaction was measured in two studies [79, 83] but no studies formally incorporated patient satisfaction into the economic evaluation. All studies were considered to have at least partially captured care quality, as all studies captured the change in health outcomes resulting from task shifting and changing outcomes can be considered an aspect of quality [87].

Of the intermediate-term outcomes, access to healthcare was captured in six studies (23%). Asiimwe et al. [61] measured the number of people linked to care following task shifting, Hamdani et al. [69] and Shrime et al. [86] explicitly included access to care following expansion with task shifting, and Sanyal et al. [76] considered the results of the economic evaluation when expanding access to care to 25% of the target population. Sharma et al. (2016) [77] and Sharma et al. (2021) [78] included the results with a change in the coverage resulting from the policy to task shift. The impact of task shifting on waiting time was not explicitly captured in any study; however, the study by Thet Lwin [82] estimated the impact on the backlog of patients with untreated inguinal hernia, which could be related to waiting times. Readmittance and complication impacts from task shifting were included in seven studies (23%). Complication rates of the task shifting procedures were captured explicitly in the studies by Gandhi et al., [66] Shrime et al. [86] and Sjöström et al. [79], the latter defining complication as the need for abortion-related treatment at an unscheduled visit within 6 weeks after the abortion. Healey et al. [71] and Thet Lwin et al. [82] included the recurrence of inguinal hernia following task shifted care and Bajre et al. [63] modelled the misdiagnosis and second presentation of the primary condition following task shifting of the reporting of lung cancer chest radiographs from radiologists to radiographers. All studies captured health outcomes in the economic evaluations. Out-of-pocket payments were included in seven studies (27%). Travel [70, 73, 76, 83, 86], accommodation [70, 73] and costs of healthcare [62, 73, 75, 83, 86] formed the OOP expenses captured. The study by Bone et al. [64] did not specify what comprised OOP costs. The impacts of task shifting on individual productivity were included in seven studies (27%). In all cases, the time away from labour force participation was captured and valued using wages [69, 70, 73, 76, 79, 83, 84]. In the economic evaluation by Galárraga et al. [84], improvements in household production measured as a change in hours collecting firewood and water were captured. All studies captured healthcare staffing costs and 15 (58%) [61, 64, 65, 67, 70, 71, 73–75, 79, 80, 82, 84–86] explicitly included the costs of training the new cadre in their costing estimates.

Of the long-term outcomes described in the logic model, the productivity of the health system was formally included in two studies. Beard et al. [62] included productivity of the surgical staff and the implications this had on wages, concluding that productivity is a key parameter of cost effectiveness. Thet Lwin et al. [82] included the productivity rate of hernia repairs per surgeon per day and the current average staff salaries. One study, Shrime et al. [86] formally captured health equity through using an extended CEA [88], which captures the social distribution of deaths averted and cases of impoverishment averted. Finally, four studies (15%) captured long-term health outcomes [66, 77, 78, 82]. The percentages of which logic model outcomes were included in the identified economic evaluations can be seen in Fig. 4.

4.3 Quality Assessment

No studies reported on all aspects of the CHEERS checklist. The background and the objectives of the study was reported in all studies; however, the details of a health economic analysis plan was reported in only two studies [64, 70]. The perspective of the economic evaluation was unclear in four studies [67, 68, 73, 79], the study population was reported in only ten studies [61, 64, 66–68, 70, 80, 81, 83, 84], and the setting and location was unclear in four studies [66, 73, 80, 83]. In two of the studies, the comparator was unclear [62, 67]. In one study, the measurement of the outcomes used in the economic evaluation was not made explicit [72] and only 11 studies provided details of the valuation of outcomes [64–67, 71, 76, 81, 83–86]. Five studies characterised heterogeneity in the evaluation [64, 67, 77, 78, 81] and two studies characterised the distributional effects of the interventions [63, 86]. Only one study reported on the approach to engaging with patients and stakeholders affected by the study [64].

All studies reported the results of the economic evaluation clearly and 17 reported on the effect of uncertainty on the results [62, 64–66, 69, 70, 72, 74–78, 80, 83–86]. All

Table 1 Summary of the economic evaluations

Author	Country	Intervention	Comparator	Type of TS	Evaluative framework; study design	Perspective	Time horizon	Health outcomes	Costs	Result
Asiimwe [61] 2017	Uganda	*Setting:* Community, household *Cadre:* Community health extension workers *Task:* HIV testing and counselling	*Setting:* Health facilities *Cadre:* Health facility workers (unclear) *Task:* HIV testing and counselling	S/D	CEA; programme evaluation and micro-costing	Programmatic	6 months	Number of persons newly diagnosed with HIV	Programme costs (personnel, transportation, equipment, supplies, building and overhead, and start-up)	$3.02 per test performed; $135.70 per positive test; $212.15 per linkage to care Currency: USD Costing year: 2016
Bajre [63] 2017	UK	*Setting:* Hospital *Cadre:* Radiographers *Task*: Reporting lung cancer chest radiographs	*Setting:* Hospital *Cadre:* Radiologists *Task:* Reporting lung cancer chest radiographs	S/D; E	CEA; modelling study	Healthcare system	5 years	QALYs	Chest x-ray costs; radiologist and radiographer reporting time; A&E treatment costs	Intervention is dominant −£4316 incremental costs, 1.35 incremental QALYs Currency: GBP Costing year: 2014/2015
Beard [62] 2022	Ghana	*Setting:* Regional hospital *Cadre:* Medical doctors (2-year general internship) *Task:* Surgical inguinal hernia repair	*Setting:* Regional hospital *Cadre:* Surgeons (6 years of surgical training) *Task:* Surgical inguinal hernia repair	S/D	CEA; cohort study	Healthcare system and provider	1 year	DALYs	Healthcare costs, OOP operation costs	Intervention is dominant −$7.80 incremental costs; 0.05 (−0.51 to 0.57) incremental DALYs averted Currency: USD Costing year: 2017
Bone [64] 2021	India	*Setting:* Community, household *Cadre:* Accredited social health activists and auxiliary nurse midwives *Task:* Antenatal and postnatal care	*Setting:* Local health or primary health centres *Cadre:* Mix of care providers *Task:* Antenatal care; rarely postnatal care	S/D; E	CEA; modelling study	Programmatic	Less than 2 years	YLL	(1) CHW training, (2) health worker incentives, (3) drug administration costs, (4) community engagement sessions and (5) supplies	Intervention is dominated ($13.0 ($2.29, $23.6) incremental costs; 0.38 (−0.82, 2.28) incremental YLL Currency: USD Costing year: 2014–17

Table 1 (continued)

Author	Country	Intervention	Comparator	Type of TS	Evaluative framework; study design	Perspective	Time horizon	Health outcomes	Costs	Result
	Pakistan	*Setting:* Community, household *Cadre:* Accredited social health activists and auxiliary nurse midwives *Task:* Antenatal and postnatal care	*Setting:* Local health or primary health centres *Cadre:* Mix of care providers *Task:* Antenatal care; rarely postnatal care	S/D; E	CEA; modelling study	Programmatic	Less than 2 years	YLL	(1) CHW training, (2) health worker incentives, (3) drug administration costs, (4) community engagement sessions and (5) supplies	ICER, $12.94 per YLL averted, (healthcare perspective); $67.80 per YLL averted (societal perspective) Currency: USD Costing year: 2014–17
	Mozambique	*Setting:* Community, household *Cadre:* Accredited social health activists and auxiliary nurse midwives *Task:* Antenatal and postnatal care	*Setting:* Local health or primary health centres *Cadre:* Mix of care providers *Task:* Antenatal care; rarely postnatal care	S/D; E	CEA; modelling study	Programmatic	Less than 2 years	YLL	(1) CHW training, (2) health worker incentives, (3) drug administration costs, (4) community engagement sessions and (5) supplies	Intervention is dominated $15.7 ($1.40, $40.05) incremental costs; 0.41 (−1.00, 2.43) incremental YLL Currency: USD Costing year: 2014–17
Chola [65] 2015	Uganda	*Setting:* Community, home *Cadre:* Peer counsellors *Task:* Breast feeding promotion	*Setting:* Public health facilities *Cadre:* Standard care provided at public health facilities *Task:* Breast feeding promotion	S/D; maybe I (unclear if cadre existed before)	CEA; modelling study	Provider	6 months	DALYs	Costs of peer counselling; costs included capital items such as motor vehicles, furniture and computers; and recurrent items such as salaries, fuel and rentals; cost of antenatal and postnatal services; diarrhoea treatment costs	ICER, $11,353 per DALY averted Currency: USD Costing year: 2007

Table 1 (continued)

Author	Country	Intervention	Comparator	Type of TS	Evaluative framework; study design	Perspective	Time horizon	Health outcomes	Costs	Result
Galárraga [84] 2017	Kenya	*Setting*: HIV outpatient clinic *Cadre:* Para-professionals *Task:* Cognitive behavioural therapy	*Setting:* HIV outpatient clinic *Cadre:* Unclear *Task:* Routine medical care	S/D; I	CBA; modelling study	Societal	6 years	Change in HIV incidence	Training costs, HIV clinic costs, drug costs, non-drug costs, labour force participation and household costs	Cost/benefit ratio, 1.13 Currency: USD Costing year: 2013
Gandhi [66] 2023	South Africa	*Setting:* Clinics *Cadre:* Nurse *Task:* Cognitive behavioural therapy	*Setting*: Clinics *Cadre*: Unclear *Task*: Cognitive behavioural therapy	S/D; E	CEA; modelling study	Healthcare payer	10 years	YLS; QALYs;	ART costs, testing costs, HIV care, CBT care	ICERs, $770 per YLS; $840 per QALY Currency: USD Costing year: Unclear
Grimes [67] 2014	Malawi	Setting: District hospital Cadre: Orthopaedic clinical officer (non-physician clinicians) *Task:* Orthopaedic care	*Setting:* District hospital *Cadre:* Fully trained orthopaedic surgeons *Task:* Orthopaedic care	S/D; E	CEA; cohort study	Unclear	6 months	DALYs	Personnel costs, procedure costs	ICER, $92.06 per DALY averted Currency: USD Costing year: 2012
Hamainza [68] 2014	Zambia	*Setting:* Community *Cadre:* Community health workers *Task:* Testing and treating malaria	*Setting:* Health facility *Cadre:* Unspecified healthy facility worker *Task:* Testing and treating malaria	S/D; E	CEA; cohort study	Unclear	Unclear	Proportion of cases treated	Personnel time, rapid diagnostic tests, microscopy where available, anti-malarial drugs and sundry maintenance, transport and consumables.	$3.56 cost per confirmed case treated (unclear if it is incremental) Currency: USD Costing year: 2011

Table 1 (continued)

Author	Country	Intervention	Comparator	Type of TS	Evaluative framework; study design	Perspective	Time horizon	Health outcomes	Costs	Result
Hamdani [69] 2020	Pakistan	*Setting:* Unclear *Cadre:* Lay health workers *Task:* Delivering a mental health self-management strategy	*Setting:* Unclear *Cadre:* Primary care physicians *Task:* Delivering a mental health self-management strategy	S/D; I (unclear if cadre existed before)	CEA; RCT	Healthcare system	3 months	Unit improvement in HADS score	Out-patient services (i.e. mental health specialists, general physicians, traditional healers, community health workers), in-patient (hospital admissions) services and out-of-pocket costs associated with travel, medications and tests	ICER, PKR 2957 per unit score improvement in total HADS score Currency: PKR Costing year: 2016

Table 1 (continued)

Author	Country	Intervention	Comparator	Type of TS	Evaluative framework; study design	Perspective	Time horizon	Health outcomes	Costs	Result
Hanlon [70] 2022	Ethiopia	*Setting:* Primary healthcare centres *Cadre:* Primary healthcare workers, health officers, nurses and community-based health extension workers *Task:* Mental healthcare	*Setting:* Hospital outpatient care *Cadre:* Psychiatric nurse *Task:* Mental healthcare	S/D; E	CEA; RCT	Healthcare sector and societal	12 months	BPRS-E; WHODAS, QALYs	Healthcare perspective: health service use and intervention costs Societal perspective: additional costs for transportation, accommodation, and caregiver lost productivity and time costs	Healthcare: −$299.82 (−454.95, −144.69) per BPRS-E; −£26.17 (−67.78, 15.44) per WHODAS; $3298.00 ($−11,908.53 to $18,504.53) per QALY Societal: −$113.27 (−217.90, −8.64) per BPRS-E; −$9.89 (−41.56, 21.78) per WHODAS; $1246.00 (−19,839.97, 22,331.97) per QALY Currency: USD Costing year: 2019
Healey [71] 2022	Zimbabwe	*Setting:* Primary care clinics *Cadre:* Lay health workers *Task:* Treatment for common mental disorders	*Setting:* Primary care clinics *Cadre:* Nurse *Task:* Treatment for common mental disorders	S/D; E	CEA; modelling study	Payer	2 years	YLD	Scale up costs, training, treatment-related activity	$191 per additional YLD averted (at current coverage levels, 12 364 service users seen over 12 months) Currency: USD Costing year: 2019

Table 1 (continued)

Author	Country	Intervention	Comparator	Type of TS	Evaluative framework; study design	Perspective	Time horizon	Health outcomes	Costs	Result
Jayasekera [72] 2017	USA	*Setting:* Outreach clinic *Cadre:* Licensed vocational nurse *Task:* 2nd Gen direct- acting antiretroviral treatment (hepatitis C) monitoring	*Setting:* Unclear *Cadre:* Hepatologist *Task:* 1st Gen direct-acting antiretroviral treatment (hepatitis C) monitoring	S/D; E	CEA; modelling study	Third-party payer	1 year	QALYs	Treatment costs, outpatient costs, inpatient care, tests and investigations	Intervention is dominant Currency: USD Costing year: 2014
Johns [73] 2014	Ethiopia	*Setting:* Health centres *Cadre:* Non-physician clinicians *Task:* NPCs initiate, monitor and manage side effects and switch treatments (maximal task shifting)	*Setting:* Hospitals *Cadre:* Physicians *Task:* Physicians managing side effects of ART and switching treatments (note, NPCs initiate and monitor ART (moderate task shifting))	S/D; E	CEA; modelling study	Unclear	2 years	Patients remaining active at the end of 2 years	Training, supervision, mentoring, and infrastructure upgrades. Patients' OOP payment for transportation, other costs for accessing care such as accommodation and food costs, and lost wages	Maximal task shifting: $36 (−$40, $111) incremental costs, −0.4% (−0.9% to 0.2%) patients remaining active at the end of 2 years Currency: USD Costing year: Unclear
Mujwara [74] 2024	Kenya	*Setting:* Combination of clinic and home Cadre: Patients themselves Task: HIV testing	*Setting:* Clinic *Cadre:* Provider (unclear) *Task:* HIV testing	S/D; E	CEA; modelling study	Societal	3 months	Number needed to treat	Medical costs (consumables and HIV test kits), labour (medical staff salary) and cost of patient time spent conducting the HIV test	ICER, I$174.51 per additional HIV test uptake Currency: ID Costing year: 2020

Table 1 (continued)

Author	Country	Intervention	Comparator	Type of TS	Evaluative framework; study design	Perspective	Time horizon	Health outcomes	Costs	Result
Ndosi [83] 2014	UK	*Setting:* Outpatient clinic *Cadre:* Clinical nurse specialist *Task:* History, physical examination, pain control, prescribing, intra-articular or intramuscular steroid injections, provision of patient education, psychosocial support and ordering blood tests or x-rays	*Setting:* Outpatient clinic *Cadre:* Rheumatologist *Task:* History, physical examination, pain control, prescribing, intra-articular or intramuscular steroid injections, provision of patient education, psychosocial support and ordering blood tests or x-rays	S/D; E	CEA; RCT	Healthcare system and societal	1 year	QALYs	NHS costs, out of pocket costs and plus productivity loss through time off work	Healthcare results including OOP expenditure, −£128 incremental costs, 0.02 incremental QALYs Currency: GBP Costing year: Unclear

Table 1 (continued)

Author	Country	Intervention	Comparator	Type of TS	Evaluative framework; study design	Perspective	Time horizon	Health outcomes	Costs	Result
Neilson [85] 2015	UK (Scotland)	*Setting:* General practices *Cadre:* Pharmacist *Task:* Pharmacist medication review with face-to-face pharmacist prescribing	*Setting:* General practices *Cadre:* GP *Task:* Medication review and prescribing	S/D; E	CCA (not explicit); RCT	Healthcare system	6 months	QALYs	Direct costs associated with the intervention (pharmacist training, pharmacist and GP time involved in delivering the intervention along with related follow-up), pain-related hospitalisation (number of hospital inpatient days, day cases and outpatient visits), primary care visits for chronic pain (GP, nurse, healthcare assistant appointments), primary care telephone contacts for chronic pain, prescribed and non-prescribed OTC pain-related medications	Pharmacists prescribing: £77.50 (−£81.7, £236.7) incremental costs, 0.0069 (−0.0091, 0.0229) incremental QALYs Pharmacists review: £54.4 (−£103.3, £212.1) incremental costs, 0.0097 (−0.0054, 0.0248) incremental QALYs Currency: GBP Costing year: 2009/2011

Table 1 (continued)

Author	Country	Intervention	Comparator	Type of TS	Evaluative framework; study design	Perspective	Time horizon	Health outcomes	Costs	Result
	UK (Scotland)	*Setting:* General practices *Cadre:* Pharmacist *Task:* Medication review	*Setting:* General practices *Cadre:* GP *Task:* Medication review	As above	As above	Healthcare system	6 months	As above	As above	–
Rogers [75] 2019	Pakistan	*Setting:* Unclear *Cadre:* Lady health workers *Task:* Screening for SAM, treated cases of SAM without medical complications	*Setting:* Outpatient health facility *Cadre:* Unspecified workers in outpatient health facility *Task:* Screening for SAM by lady health workers, outpatient health facility treats all cases	S/D; E	CEA; modelling study	Societal	1 year	Number of children recovered	Treatment, supervision and monitoring, training, support, household	ICER, $146 per additional child recovered $10.18 incremental cost, 6.95% incremental outcome Currency: USD Costing year: 2015/2016
Sanyal [76] 2019	Canada	*Setting:* Community pharmacy (unclear where this is) *Cadre:* Community pharmacist *Task*: Initiation of treatment and management of uncomplicated UTI	*Setting:* Primary care *Cadre:* (i) Family physicians; (ii) Emergency physicians in primary care *Task:* Initiation of treatment and management of uncomplicated UTI	S/D; E	CEA; modelling study	Public healthcare system	1 year	QALMs	Healthcare professional costs, medication costs	Family physician ICER, $1,381,200 per QALM Emergency physician ICER, extendedly dominated Currency: CAD Costing year: 2018

Table 1 (continued)

Author	Country	Intervention	Comparator	Type of TS	Evaluative framework; study design	Perspective	Time horizon	Health outcomes	Costs	Result
Sharma [77] 2016	Kenya	*Setting:* Home *Cadre:* Community health workers *Task:* HIV testing and education	*Setting:* Clinic *Cadre:* Health advisors (unclear) *Task:* HIV testing and education	S/D; E	CEA; modelling study	Payer	10 years	HIV infections averted, DALYs averted	Personnel, transportation, equipment, supplies, buildings and overhead, start-up, and phones and data monitoring	ICER, $615 per DALY averted $9.9m incremental cost, 16,192 incremental DALYs averted Currency: USD Costing year: 2014
Sharma [78] 2021	South Africa	*Setting:* Public clinic, providing primary care services *Cadre:* Enrolled nurse (registered nurse in the USA) *Task:* HIV care, HIV management, ART side effects, adherence counselling, and appropriate referral systems	*Setting:* Public clinic, providing primary care services *Cadre:* Professional nurse (nurse practitioner in the USA) *Task:* HIV care, HIV management, ART side effects, adherence counselling, and appropriate referral systems	S/D; E	CEA; modelling study	Payer	20 years	DALYs averted	HIV testing, ART costs, annual healthcare costs	ICER, – $358 per DALY averted Currency: USD Costing year: 2018
Shrime [86] 2015	Ethiopia	*Setting:* Unclear *Cadre:* Non-surgeon providers *Task:* Thirteen surgical conditions	*Setting:* Unclear *Cadre:* Surgeons *Task:* Thirteen surgical conditions	S/D; E	ECEA; modelling study	Unclear	Single event	Deaths averted	Procedure costs	Task sharing scenario: overall population 64 deaths averted per $100,000 spent and – 145 cases of impoverishment averted Currency: ID Costing year: Unclear

Table 1 (continued)

Author	Country	Intervention	Comparator	Type of TS	Evaluative framework; study design	Perspective	Time horizon	Health outcomes	Costs	Result
Sjöström [79] 2016	Sweden	*Setting:* Hospital outpatient *Cadre:* Nurse-midwife *Task:* Counselling and physical examination	*Setting:* Hospital outpatient *Cadre:* Physician *Task:* Counselling and physical examination (note in both intervention and comparator, nurse-midwives gave additional information and medication)	S/D; E	CEA; RCT	Unclear	Unclear	Abortion with avoided surgical intervention	Cost of midwives and physicians time, usage of surgery rooms, consultation time for second opinion with a physician or senior physician, cost of the treated women's time, and training of participating midwives was constructed; cost of complications	ICER, €− 1768.8 per avoided surgical intervention Currency: EUR Costing year: 2011
Tabana [80] 2015	South Africa	*Setting:* Community (home) *Cadre*: Lay counsellors *Task:* HIV counselling and testing	*Setting:* Public clinics *Cadre:* Lay counsellors + professional nurses *Task:* HIV counselling and testing	S/D; E	CEA; RCT	Provider	1 year	% increase in uptake	Intervention costs as follows; (i) start up, (ii) overheads, (iii) training, (iv) HIV counselling and testing, and (v) HIV lay counsellor supervision	$19 per % increase in uptake Currency: USD Costing year: 2010

Table 1 (continued)

Author	Country	Intervention	Comparator	Type of TS	Evaluative framework; study design	Perspective	Time horizon	Health outcomes	Costs	Result
Timmermans [81] 2017	The Netherlands	*Setting:* Hospital wards *Cadre:* Physician associate (alongside MDs) *Task:* treatment, perform predefined medical procedures and prescribe medication	*Setting:* Hospital wards *Cadre:* MDs *Task:* treatment, perform predefined medical procedures and prescribe medication	S/D; E; I	CEA; non-randomised matched controlled	Healthcare system	1 month	QALYs	Direct costs associated with the principal admission and costs that occurred within 1 month after discharge that were potentially related to hospital admission	€ 568 (− €254 to €1391) incremental costs, + 0.02 (− 0.01 to 0.05) incremental QALYs Currency: EUR Costing year: 2014
Thet Lwin [82] 2022	Ghana	*Setting:* Regional hospital *Cadre:* Medical doctors *Task:* Inguinal hernia repair	*Setting:* Regional hospital *Cadre:* Surgeons *Task:* Inguinal hernia repair	S/D; E	CEA; modelling study	Healthcare system	10 years	DALYs averted	Direct costs associated with the surgery, staff costs, operating room costs, capital costs	Intervention is dominant $− 6.97m incremental costs, 0 incremental DALYs averted Currency: USD Costing year: 2020

A&E accident and emergency, *ART* antiretroviral therapy, *BPRS-E* Brief Psychiatric Rating Scale, *CBT* cognitive behavioural therapy, *CBA* cost-benefit analysis, *CCA* cost-consequence analysis, *CEA* cost-effectiveness analysis, *CHW* community health worker, *DALYs* disability-adjusted life-years, *E* enhancement, *ECEA* extended cost-effectiveness analysis, *EUR* Euros, *GBP* British pounds, *GP* general practitioner, *HADS* Hospital Anxiety and Depression Scale, *HIV* human immunodeficiency virus, *I* innovation, *ICER* incremental cost-effectiveness ratio, *ID* international dollars, *NHS* National Health Service, *OOP* out-of-pocket, *OTC* over the counter, *PKR* Pakistani rupees, *QALYs* quality-adjusted life-years, *QALMs* quality-adjusted life-months, *RCT* randomised controlled trial, *SAM* severe acute malnutrition, *S/D* substitution/delegation, *USD* US dollars, *WHODAS* WHO Disability Assessment Schedule, *YLD* years of life lost to disability, *YLL* years of life lost, *YLS* years of life saved

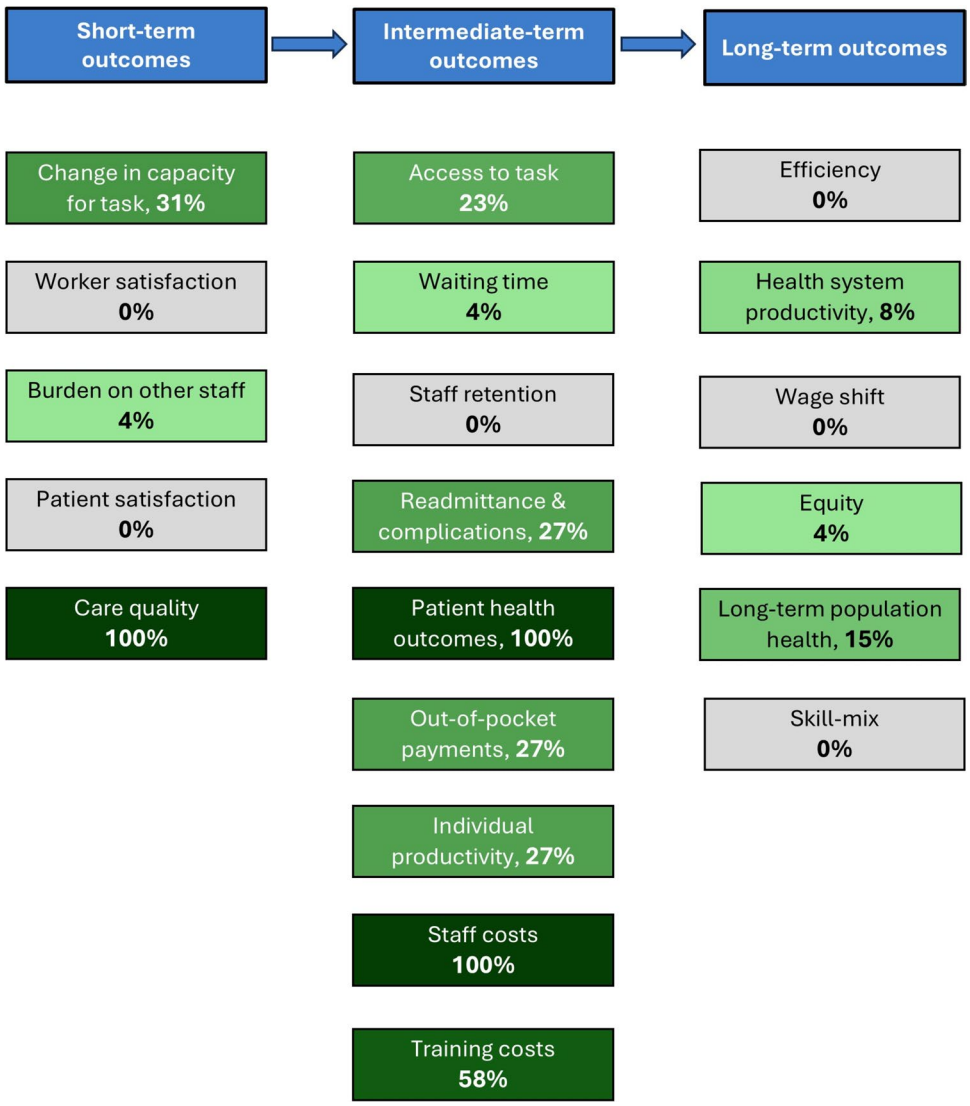

Fig. 4 Logic model outcomes captured in the identified studies. Note, the colour of each box represents the level to which it was included in the economic evaluations identified in the literature, with a range from grey (0%) to dark green (100%)

studies reported on the findings, limitations and the current knowledge. It is important to note that the reporting quality of the studies may not reflect methodological quality. The results of the CHEERS checklist for each study are in the ESM.

5 Discussion

In the context of a global health workforce shortage [2] and for the advocation of task shifting as a potential solution [5, 37], this study aimed to shed light on the potential costs and consequences of task shifting with the hope of improving future economic evaluations to inform priority setting. We considered this important as task shifting will inevitably use scarce resources and economic evaluations can be used to inform whether the benefits of one use of resources outweigh other uses. The logic model provides insights into the potential consequences of task shifting. These may be fundamental to the value proposition of the decision to task shift. For example, task shifting may impact human resource constraints through reduced worker satisfaction, increased burden on staff and retention issues, presenting a potential health system constraint and ultimately impacting net population health [89].

It may not be possible or even appropriate to incorporate all domains of the logic model in an evaluation. If applying our logic model, analysts may still choose to omit some domains in their final evaluation. Even where the same domains and outcomes are included, results may not be comparable across studies because of other sources of heterogeneity such as the study setting or time horizon. For example, the rapid review identified seven studies that accounted for OOP payment impacts as a result of task shifting, but the

exclusion of OOP payments may only indicate a limitation if the evaluation is in a country in which healthcare is financed through OOP payments. It is hoped our work helps make the omission of important costs and consequences explicit. Our work should be considered alongside appropriate economic evaluation method guidelines and may improve the quality of economic evaluations of task shifting.

The short-, intermediate- and long-term consequences present a list of potentially important impacts that require measurement in future evaluations but their incorporation into an economic evaluation may be challenging. For example, the impact on patient satisfaction is described in the literature as a consequence of task shifting [6, 28, 36, 38, 43–46] and therefore it was included in our logic model. Two studies measured the impact of task shifting on patient satisfaction when estimating effectiveness but did not formally include it in the CEAs. The first was Ndosi et al. [83] using the Leeds Satisfaction Questionnaire [90] following task shifting from rheumatologists to clinical nurse specialists. The second was Sjöström et al. [79] measuring acceptability of task shifting of abortion defined as the preferred provider should the woman have a future abortion. The incorporation of these measures may impact the value attributed to task shifting but as yet are not easily incorporated into economic evaluations. CEA is the predominant method adopted in the identified studies, so patient satisfaction would need to be translated into appropriate outcome measures, for example a generic measure of health such as QALYS or DALYs. Future work may focus on the outcomes in the logic model to identify the most appropriate methods and evaluative frameworks to capture the value of task shifting.

The predominance of a CEA over other evaluative frameworks identified in this review reflects trends observed in methods used in a global priority setting [91]. The requirement of a CEA for outcomes to be expressed in units of health (e.g. QALYs, DALYs or life-years gained) may make the inclusion of non-health outcomes or outcomes relevant to health workers challenging, potentially explaining their omission. For example, staff retention impacts were not included in any economic evaluations despite this being of importance to task shifting with implications for health equity through retention of staff in under-served, often rural areas [92]. Further, the use of a CEA may hinder the inclusion of health equity considerations, which may be of particular importance in LMICs. The literature does describe approaches to allow a CEA to incorporate outcomes beyond health [88, 93–95], which may improve future economic evaluations. The use of the domains identified in the logic model may inform the selection of the methods. For example, if equity is an important aspect, then a distributional CEA [93] or an extended CEA [88] may be appropriate. Alternative approaches such as cost-benefit analysis or cost-consequence analysis may also help facilitate broader outcomes, the former through the monetary valuation of all outcomes, therefore allowing aggregation, and the latter through the reporting of the disaggregated outcomes. The adopted approach will have strengths and weakness [96], but should ultimately reflect the preferences of the decision makers.

The reporting quality of the identified studies revealed areas that were well reported such as the perspective. The perspective is critical for defining the types of costs and outcomes that are included in the economic evaluation, thus making it possible to consider which domains of the logic model should be included in a task shifting evaluation. The setting and location and the intervention and comparators are also well described, meaning the external validity of the results can be assessed. In contrast, reporting of uncertainty was limited. This is a considerable weakness in the economic evaluations, as if decision makers are to be fully informed, it is important that decisions to implement the task shifting interventions identified in this study are not made purely based on point estimates.

An aspect of task shifting that emerged is the distinction between task shifting in which there are no health workers able to conduct the task and those in which the new cadre taking on the task can conduct it alongside the old cadre. This could be delineated as task shifting and task sharing, the former concerns delegation, while the latter focuses on collaboration between cadres [19]. Although they may differ in their implementation criteria, the results of the logic model and rapid review provide evidence that applies to both. For example, the study by Beard et al. [62] estimated the cost effectiveness of surgeons and doctors in Ghana performing inguinal hernia repair and then compared surgeons to doctors. The cost effectiveness of the two scenarios differed yet they will likely have important differences in the changes in capacity, coverage and health equity as many first-referral hospitals in Ghana do not have a surgeon [62]. The logic model would make explicit the consequences beyond simply the cost effectiveness and may be important in the distinction between task shifting and task sharing.

5.1 Strengths and Limitations

The comprehensive search strategy used to identify the evidence in the rapid review is a strength of this research. The systematic search of five databases including forwards and backwards citation searching aimed to identify the literature of difficult to define interventions. The difficulty in defining task shifting does, however, represent a potential limitation. The inclusion criteria limited studies to those in which it was explicit that the intervention involved task shifting.

The breadth of potential studies that could be considered task shifting despite not making it explicit means there are potentially many additional studies that could be included in the synthesis. For example, using the taxonomy presented by the European Commission [6, 12], task shifting categorised as *enhancement* may mean any economic evaluation that involves a health worker undertaking a task that was not previously done would be considered task shifting.

The study is a rapid review that uses many of the approaches of a systematic review conducted with methodological restrictions in an accelerated process [59]. The restrictions adopted in our review were for pragmatic reasons and included the use of one reviewer to screen and extract data, the omission of grey literature, and the limitation of database searching to five databases with language and date limitations. These decisions were made to conduct the rapid review in a timely manner but the potential for bias in the results remains.

In the screening stage, it was difficult to determine if studies were examples of task shifting as comparators were often described as 'service as usual' or 'standard care'. Similarly, there are examples of economic evaluations of CHWs [55, 97]; however, it is not always clear which cadre the tasks are being shifted from. In several studies included in the synthesis, it was not explicit which cadre formed the comparator [65, 66, 84]. These studies were included, however, as the interventions were defined as involving task shifting. In addition, there were four studies [61, 68, 74, 75] that did not make the comparator cadre explicit but rather defined them as healthcare providers or workers in a health facility. Thus, the accurate detection and reporting of studies involving task shifting was challenging and studies may have been missed.

A further limitation of our study was that the logic model was not informed by a systematic review of the literature nor was it informed by the results of the rapid review. The logic model was developed as an a priori model to represent a priori knowledge and assumptions [98], and only partly involved an iterative aspect through the feedback from the workshop. We considered it useful to show the extent to which economic evaluations explicitly incorporated the intended and unintended consequences of task shifting as defined in the literature. While we are aware that this approach is inflexible to the consequences described in the studies in the rapid review, an alternative approach such as a staged or iterative logic model [98] would not have answered the question regarding to what extent the literature defined consequences are included in applied examples. Future work may strengthen the conceptual nature of the logic model by considering empirical validation of the domains and the impact on results of economic evaluations.

6 Conclusions

Task shifting results in an array of consequences that may impact the value for money and population health impact of the policy. The identification of studies in high-income countries as well as LMICs indicates task shifting is being considered in healthcare systems globally and it will be important to consider country-specific contexts in evaluations. The majority of studies identified a range of costs and consequences that may only be appropriate for resource allocation under the strong assumption that all longer term costs and consequences would be unaffected by the task shift. This paper adds value by laying out the logic model that future evaluations could use as a reference to make explicit the costs and consequences they include, and the assumptions implied regarding those they omit.

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Conflict of interest Peter Murphy, Susan Griffin, Helen Fulbright and Simon Walker have no conflicts of interest that are directly relevant to the content of this article. Simon Walker is an Editorial Board Member of *Pharmacoeconomics*. He was not involved in the selection of peer reviewers for the manuscript nor any of the subsequent editorial decisions.

Ethics approval The study was exempt from an ethics review.

Consent to participate Not applicable.

Consent for publication Not applicable.

Availability of data and material All data extracted and used in the synthesis are described in the article.

Code availability Not applicable.

Author contributions PM, SG and SW contributed to the study conception and design. Database searching was conducted by HF. Data extraction and analysis was performed by PM. The first draft of the manuscript was written by PM and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

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