INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH AND INNOVATIVE STUDIES
IJSRIS journal
ISSN: 2820-7157
Advancing Knowledge, Inspiring Innovation
www.ijsrisjournal.com
INDEXED JOURNAL
PEER REVIEWED Rigorous & Transparent
DOI: CROSSREF Member
OPEN ACCESS For Global Visibility
BI-MONTHLY Timely Publication
WIDE READERSHIP High Impact & Visibility
AUTHOR FRIENDLY Fast | Supportive | Reliable
RECEIVED 17 September
ACCEPTED 09 October
PUBLISHED 1 November 2026
September 2026
Volume 5
Number 6
Pages from 409 to 431

Estimating medical costs in health economics: Methodology and contributions of the narrative review

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Crossref doi
PREFIX : 10.63883
IJSRIS JOURNAL
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ABSTRACT

Introduction. Estimating medical costs requires linking care pathways to resource use and to a valuation method. A narrative review can inform these choices by integrating medical, economic and management knowledge. The aim is to propose a narrative review approach structured according to IMRAD, applied to understanding and critically appraising medical cost studies. Methods. This methodological narrative review links review methods, management accounting and health economics. Searches in Scopus, PubMed, ScienceDirect and Web of Science (last search on 24 October 2026) produced a traceable register of 8,513 records. A purposive selection of 84 references was supplemented by two methodological publications identified in a targeted search on 24 November 2026. The analysis covers perspective, resources, valuation, shared overheads, time horizon and uncertainty. Results. The synthesis is organised into six themes: scope and nature of monetary values; practical capacity and time; allocation of shared overheads; unit costs and currency conversion; reporting and uncertainty; indirect costs and financial protection. Differences between estimates may arise from scope, capacity, allocation rules and price year, irrespective of the name of the method. The review proposes a six-step appraisal framework, an extraction grid and consistency checks adapted to the available data. Discussion and conclusion. The narrative review supports contextualisation and the analysis of discrepancies but does not replace the data required for an empirical estimate. Its value depends on the traceability of sources, the distinction between costs and payments, and the control of double counting. Implications for health management and policy should remain proportionate to the quality and transferability of the data.

Keywords: narrative review; IMRAD; medical costs; cost of illness; health economics; management accounting; micro-costing.

1. INTRODUCTION

Measuring medical costs lies at the crossroads of several disciplines. Medicine defines health states, diagnostic and therapeutic pathways, complications and follow-up needs. Economics specifies the object of the evaluation and the value of the resources used. Management describes how these resources are organised, consumed and distributed across activities. An analysis that neglects one of these dimensions may produce an amount that is difficult to interpret or to transfer to another setting.

The narrative review provides a space for connecting these bodies of knowledge. Snyder presents the literature review as a method whose contribution depends on the fit between objective, selection and synthesis [1]. The writing advice of Green and colleagues underlines the value of structured preparation [2]. These sources make it possible to envisage a review that explains how estimates are constructed, rather than juxtaposing published amounts.

Management sciences add a complementary requirement: specifying what new understanding the synthesis provides. Post and colleagues consider, in particular, the clarification of constructs and the analysis of assumptions and mechanisms as routes to theoretical contribution [3]. Applied to medical costs, this requirement leads to examining why two studies of the same disease may reach different results.

The aim of this manuscript is to propose a narrative review methodology in IMRAD format for understanding the estimation of medical costs, examining its limitations and discussing its implications. It is neither an estimate of the cost of a particular disease nor a quantitative synthesis of costs in Morocco. The proposed contribution is an articulation between clinical context, economic choices and the managerial treatment of resources, translated into a six-step appraisal framework and an extraction grid applicable to the Moroccan context.

2. METHODS

2.1 Type of Review and Guiding Question

This is a methodological narrative review with a pedagogical and analytical aim. The guiding question is: how should the literature be searched, organised and discussed in order to understand and assess how a medical cost is constructed? Two bodies of literature were brought together: methods of review and conceptual synthesis; and methods for measuring and valuing health care costs. Recommendations presented as proposals of the manuscript are distinguished from the lessons attributed to the sources.

2.2 Literature Search and Scope

The search was conducted from 18 to 24 October 2026. A targeted search of the Web, publishers' pages and university repositories first identified reference texts on review methodology and cost estimation. Structured searches were then run on 18 October in Scopus and PubMed, and on 20 October in Scopus, ScienceDirect and the Web of Science Core Collection. Documentary checks were closed on 24 October 2026. The 34 search strings, their themes and their volumes are presented in Supplementary Material S1.

The indexing window searched was 2022–2027; the 2027 bound covers only publications already indexed under that year. The search strings combine cost terms (medical cost*, cost of illness, microcosting, activity-based costing) with method terms (allocation, transferability, uncertainty, caregivers, productivity). EconLit was not searched. Additional references, notably foundational ones published before 2022, were identified through targeted searching and in the documents provided; they are analysed according to their methodological relevance and are not counted in the export totals.

A complementary targeted search, carried out on 24 November 2026 in PubMed and on publishers' pages, identified two additional methodological publications [4,5]. They were retained to clarify cost terminology and the handling of uncertainty. The first text was consulted in full (PubMed Central) and the second through its abstract and the publisher's page. These references do not result from an exhaustive re-run of the 34 search strings; they therefore change neither the counts of the October register nor the search flow diagram.

2.3 Selection and Critical Appraisal

The narrative selection favours studies that describe a method for measuring or valuing resources, make perspective and allocation choices explicit, or allow the limitations of estimates to be discussed. Foundational texts published before 2022 are retained for interpretation. Publications are distinguished according to the content actually consulted: full text, accessible sections or abstract. Open-access sources are examined first, without this status

being treated as a validity criterion. Analyses of non-monetised resources may inform measurement but are not treated as cost estimates. This purposive selection is not an exhaustive screening of the bibliographic register.

The targeted sources comprise methodological reviews and applied studies, analysed by theme (section 3.8). When the full text was not obtained, only information from the abstract or accessible sections is used. Because reviews and their primary studies may overlap, their counts are not added together. Repeated versions and corrections are matched to the original publications, and protocols are distinguished from observed economic results.

Moroccan studies and work on health programmes are used to examine the conditions for transferring methods and the data needs (section 3.9). Amounts derived from a model, a tariff or an approximation are distinguished from observed costs. Studies involving members of the team are examined with the same critical grid as other sources.

Document tracking matches titles, DOIs and files obtained. For the 56 records redirected after re-examination, 43 complete articles or protocols and two conference abstracts were obtained; 11 documents were not retrieved (Figure 1). This tracking describes document retrieval; the scientific eligibility of this subset remains to be established.

The thematic analysis records the perspective, population, pathway, cost scope, quantities, unit values, allocation rules, time horizon and handling of uncertainty (Appendix A). The register underwent pre-screening by lexical ranking and conservative automated checking. The 375 negative orientations produced by these rules were re-examined individually on title and abstract, one of them on title alone because no abstract was available. An economic estimate or a measurement of resources justified full-text reading; DALYs, socioeconomic indices and clinical outcomes alone were not treated as costs. Decisions and their reasons are kept in the register. This assisted re-reading is not equivalent to independent double screening. Appendix B positions the manuscript against the SANRA criteria [6]. The numerical teaching examples are fictitious.

3. RESULTS

3.1 An Interdisciplinary Documentary Framework

The core references combine general method [1,2,6], management and conceptual research [3,7,8], and health economics or cost management [9–15]. The recent Scopus corpus forms a complementary set still under examination. A reporting guideline does not validate a calculation method, and an applied study does not demonstrate the universal superiority of one approach.

Table 1: Functions of the references used

Source	Contribution to the review	Limitation to respect
Snyder, 2019 [1]	Choosing a synthesis approach	General typology, not specific to costs
Green et al., 2006 [2]	Preparing and writing a narrative review	Methodological advice
Baethge et al., 2019 [6]	Appraising narrative quality with SANRA (Scale for the Assessment of Narrative Review Articles)	Tool developed in a biomedical context
Post et al., 2020 [3]	Specifying the conceptual contribution	Editorial perspective in management
Jaakkola, 2020 [7]	Making the role of theories explicit	Concerns conceptual articles
Jo, 2014 [9]	Defining cost of illness and perspectives	General framework to be contextualised
Frick, 2009 [10]	Measuring resources by micro-costing	Demanding detailed data collection
Cunnama et al., 2016 [11]	Combining top-down and bottom-up	Application in a given context
Špacírová et al., 2020 [12]	Distinguishing the dimensions of costing	Terminology and assumptions to be made explicit
Global Health Cost Consortium (GHCC), 2017 [13]	Designing a cost estimate for services	Does not cover the full societal burden
Turner et al., 2019 [14]	Handling price year and currencies	Choice depends on the objective
Husereau et al., 2022 [15]	Reporting the economic analysis	CHEERS (Consolidated Health Economic Evaluation Reporting Standards) is not a validity score
Sauer and Seuring, 2023 [8]	Linking question, selection and synthesis	Guide to systematic reviews

3.1.1 Search Results in the Four Bibliographic Sources

The 34 searches or analytical sets yield 13,382 occurrences for the period 2022–2027 (Table 2). For Web of Science, 904 records outside the period were removed before consolidation; the ten searches yield 1,177 distinct identifiers.

Table 2: Volumes exported by bibliographic source

Source	Sets	Occurrences	Indexing window
Scopus	12	6,421	2022–2027
PubMed	3	1,878	2022–2027
ScienceDirect	9	3,504	2022–2027
Web of Science	10	1,579	2022–2027
Total	34	13,382	Last search 24 October 2026

After matching occurrences across searches and databases (4,869 groupings), the consolidated register contains 8,513 rows, of which 8,445 have a DOI and 8,162 an abstract. Fifteen additional duplicates were linked without deleting the source rows, giving 8,498 groups. The integrity check flagged seven retracted records and one record from 2021 outside the window, kept for traceability. Details of the matching are provided in Supplementary Material S1.

After pre-screening and re-examination, 8,121 records are directed to full-text reading and 369 exclusions are proposed; 15 duplicates, seven corrections and one record to be completed are linked (Figure 1). These orientations are not inclusions. The references used in the synthesis result from a purposive selection and are presented by theme in sections 3.8 and 3.9.

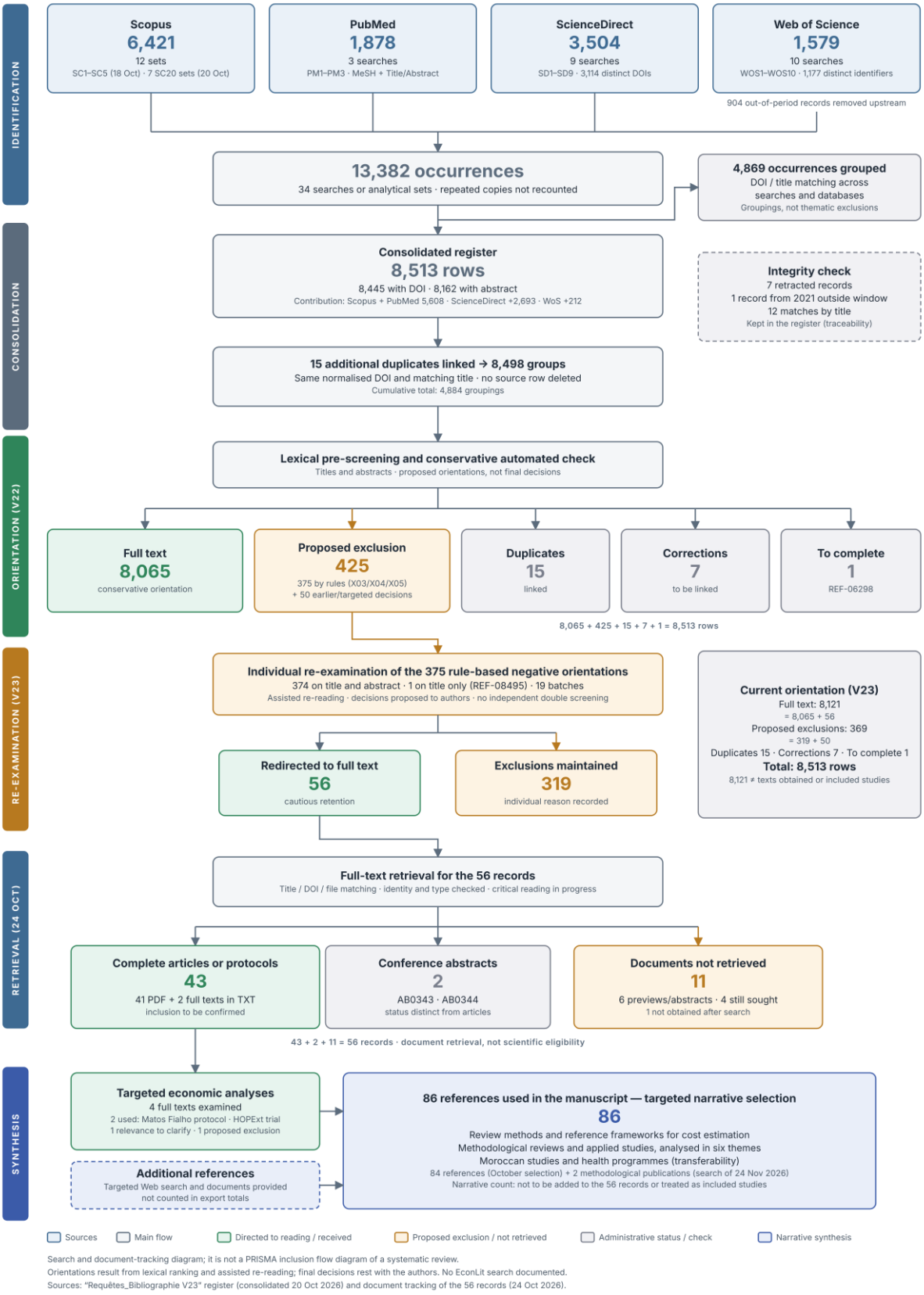


Figure 1: Literature search, orientations and document retrieval as of 24 October 2026

3.2 Distinguishing Medical Cost from Economic Burden

Jo describes the cost of illness as a set of resources and economic consequences whose scope depends on the perspective adopted [9]. A medical cost here corresponds to care resources: consultations, tests, treatments, hospitalisation, rehabilitation and follow-up relevant to the object studied. Transport, non-medical accommodation, caregiver time and productivity losses belong to other components of the burden. They should not be silently incorporated into an amount labelled “medical cost”.

Perspective answers the question “for whom is cost measured?”. A facility may seek to know the resources consumed; an insurer, the amounts reimbursed; a household, its payments; a societal analysis, a broader scope of resources and consequences. A reimbursement should not be added to the production cost of the same care to compute a societal cost: it may represent the financing of that same resource. A comparison therefore requires identifying what each amount measures.

Table 3: Scopes to be kept separate

Component	Example	Classification
Medical resources	Medicines, tests, nursing and medical staff	Medical costs according to perspective
Insurer payments	Reimbursement of a hospital stay	Payer expenditure
Patient payments	Co-payments and purchases of care	Medical out-of-pocket costs
Non-medical resources	Transport and non-medical accommodation	Direct non-medical costs
Time and lost production	Absence from work, informal care	Societal components to be defined
Pain and quality of life	Lived consequences of the disease	Not automatically monetary costs

The synthesis by Turner et al. [4] points out that cost categories may overlap: a financial cost describes the expenditure incurred, whereas an economic cost reflects the value of resources and their alternative uses, including when some resources involve no payment. The distinction between overhead costs, in the accounting sense, and productivity losses, in the economic sense, must be explicit. To avoid double counting, the choice of each category must be justified by the objective of the study.

3.3 Linking Clinical and Economic Reasoning

The medical component defines the events that make resources necessary: diagnosis, severity, stage, treatment, complication, recurrence or follow-up. The economic component determines their scope and valuation. The management component examines processes, capacities and allocation rules. The proposed analysis links these dimensions at each step of the pathway rather than treating clinical information as mere introductory context.

This articulation leads to distinguishing observed cost from the cost of recommended care. The former depends on the care actually received, access and practices. The latter corresponds to a normative scenario that must be described. A low observed cost may reflect care not delivered, loss to follow-up or early death; it does not demonstrate good efficiency. This possibility must be examined using clinical and pathway data, not presumed for a given population.

3.4 Identifying, Measuring and Valuing Resources

Frick presents micro-costing as the detailed collection of resources and their value, drawing in particular on records, administrative databases, observation and interviews [10]. The GHCC proposes principles for designing a cost estimate of health services fit for its purpose [13]. These sources support the separation between identifying resources, measuring them in natural units and assigning a monetary value.

For a patient i, a teaching calculation following the micro-costing logic described in [10] can be written as Equation (1):

$$C_{medical,i} = \Sigma_j \, (q_{ij} \times c_j) + H_i \qquad (1)$$

where q_{ij} denotes the quantity of resource j consumed, c_j its unit value and H_i the share of shared overheads not already included in unit values. This formulation requires the components to be defined: if unit costs are full costs, adding the same shared overheads a second time creates double counting. The result is a cost calculated according to a stated convention, not a measurement independent of any assumption.

3.5 Choosing an Appropriate Costing Approach

Špacírová and colleagues distinguish the level of detail of resources, from micro-costing to gross-costing, from the calculation logic, top-down or bottom-up [12]. These dimensions are not synonyms. Cunnama and colleagues illustrate the joint use of top-down and bottom-up approaches to assess the costs of a technology in resource-limited settings [11]. Their complementarity must be examined according to the object studied and the data available.

Table 4: Costing choices and questions to examine

Choice	Principle	Point of attention
Top-down	Distribute aggregate costs across activities or services	Justify allocation keys
Bottom-up	Start from resources consumed by patients	Check that pathways are representative
Micro-costing	Identify resources at a high level of detail	Balance useful precision and data-collection effort
Gross-costing	Use more aggregated units of care	Define what each unit contains
ABC (activity-based costing) or TDABC (time-driven ABC)	Link costs to activities and their drivers	Describe capacity and time assumptions

The approach proposed for a review is to compare first the operations actually performed rather than the label declared by the authors. A study may collect individual resource use and then value part of it with average hospital costs. This combination must be described. Detailed calculation does not guarantee representativeness, and an aggregated method may be relevant for a clearly defined management question.

Turner and colleagues distinguish the level of disaggregation (gross-costing or micro-costing) from the way resources are allocated (top-down or bottom-up), which do not always coincide [4]; it is proposed to document each separately. A hybrid approach may combine individual measurement of medicines, consumables and care time with top-down allocation of shared expenditure. The proposed validation has two levels: a plausibility check of each item and reconciliation of aggregates with the accounts, taking differences in scope into account.

3.6 Organising the Manuscript According to IMRAD

The IMRAD structure is a proposed format of presentation for this application. It helps distinguish what was searched for, what the texts report and the interpretation proposed. Sauer and Seuring stress the importance of linking question, selection and synthesis in management reviews, while working on systematic reviews [8]. Using this reasoning in a narrative review does not automatically confer that status on it.

Table 5: IMRAD applied to a review of medical costs

Section	Expected content	Check question
Introduction	Clinical problem and economic issue	Why this review?
Methods	Sources, selection and comparison	What approach was followed?
Results	Perspectives, resources and valuation	Are the objects comparable?
Discussion	Explanations and transferability	Are the interpretations supported?
Conclusion	Lessons and missing data	What scope can be retained?

3.7 Comparability of Estimates and Uncertainty

A comparison must at least specify the disease and its definition, severity, care sector, perspective, cost unit and observation period. A cost per stay is not directly comparable with an annual cost per patient or a lifetime cost. An incidence-based study and a prevalence-based study over one year do not necessarily answer the same question. Differences in scope must be described before any interpretation of performance.

Turner and colleagues show that choices regarding inflation adjustment and currency conversion can change results [14]. A review must therefore record the price year, the index chosen, the original currency and the conversion method. Presenting all values in a single currency is not enough to make different health systems, populations or accounting conventions comparable.

Uncertainty may arise from quantities, unit values, missing data and model choices. A sensitivity analysis varies stated assumptions; a confidence interval concerns a statistical estimate under a model and a sampling scheme. These two objects must remain distinct. For an empirical study, the handling of variability and extreme values must be justified. For the present review, no pooled effect and no aggregated mean cost across publications is calculated.

The guide by Botwright et al. [5], intended for economic evaluations in resource-constrained settings, recommends targeting uncertainty analysis on the elements likely to change the decision. Transposed to cost studies, it is proposed to distinguish three sources: parameters (quantities, prices and durations), structure (pathway, omitted items, allocation rules) and methodological choices (perspective, time horizon, valuation conventions). Scenarios must be justified and their consequences presented separately from between-patient variability.

3.8 Thematic Synthesis of the Publications Analysed

The publications analysed are grouped into six themes, which correspond to the main sources of discrepancy between estimates. For each theme, the synthesis draws a lesson and the resulting check point for a cost review (Table 6, section 3.9.3).

3.8.1 Scope, Perspective and Nature of Monetary Values

The review by Leusder and colleagues distinguishes provider costs from payments and reimbursements; it recommends describing the calculation steps and the scope of the pathway rather than relying on the terms used by the authors [16]. Our synthesis therefore keeps separate fields for perspective, resources measured and the nature of monetary values. These authors' preference for ABC or TDABC applies to value-based care, not to every economic question.

The review by Guinness and colleagues analyses the role of cost accounting in hospital pricing and reimbursement in low- and middle-income countries [17]. Its abstract and accessible editorial material indicate a concentration of experience in Asia and limited documentation of how costs translate into pricing decisions. This source supports the distinction between producing cost data and setting prices: a tariff may depart from the resources actually consumed.

The Portuguese study by Ortet and colleagues illustrates an estimate based on a standard pathway, times derived from documents and expert opinion, and reference salaries [18]. The specific needs of different diseases are only partly covered, and some infrastructure and shared overheads are excluded. The calculated value therefore corresponds to a reconstructed cost, distinct from a full cost observed for each patient.

The authors then divide the calculated amount by 0.51 to obtain an extrapolated cost [18]. This operation relies on an external proportion and does not directly measure the omitted resources; the study does not compare the programme with conventional care. Our analysis thus distinguishes three bases of calculation: observed, reconstructed or extrapolated cost. This grid is an interpretive proposal that remains to be validated.

3.8.2 Practical Capacity, Time and TDABC

The review by Iachecen and colleagues includes 70 studies and reports validation of process maps in 23 of them, without formal assessment of risk of bias [19]. The accuracy of a time-driven activity-based costing (TDABC) estimate therefore depends on how the pathway and times are constructed. The abstract mentions 33% of studies based on hospital sources, whereas the results describe 33 studies, i.e. 47.1%; in the absence of consistent definitions, this figure is not reported as a consolidated result.

Koster and colleagues apply a fuzzy-logic-enhanced TDABC to a rheumatoid arthritis pathway [20]. The cost per minute relates the cost of a resource to its practical capacity, and durations are then valued by activity. The authors make explicit how meetings, leave and non-care tasks are handled. Times remain partly self-reported and the scopes of the ABC and TDABC comparators differ: the difference in amounts reflects conventions more than precision. The capacity assumed and the activities covered must be extracted separately.

Defourny and colleagues develop a national TDABC model of radiotherapy based on providers' resources, distinguishing the cost of available, used and unused resources [21]. Practical capacity determines the cost per minute; self-reported times may also reflect professional interests. A national estimate must be confronted with varied local settings. The document consulted is the accepted manuscript of 15 July 2022, published in 2023.

The review of 35 studies by Ali and colleagues highlights variations in practical capacity, staff valuation, depreciation and overhead allocation [22]. The 80% capacity rate used in some applications is a convention, not a norm. Insufficiently described software limits reproducibility, and only two studies cover some patient or family costs. The level of evidence according to study design says nothing about the quality of the economic calculations.

In 63 patients operated on for cervical myelopathy, the mean cost of the scope studied is US$16,488.99 [23]. The preoperative and postoperative phases include staff only; supplies and overheads are mainly counted in the operating theatre. The last preoperative consultation is covered, but earlier consultations and post-discharge follow-up are absent, and salaries come from averages of recruitment websites. This is a partial estimate of the pathway, which does not allow the efficiency of surgical approaches to be compared in the absence of functional outcomes.

A comparison of the cost of a non-contrast magnetic resonance imaging (MRI) examination reports INR 1,291.51 (Indian rupees) with traditional costing, INR 3,613.77 with ABC and INR 2,764.39 with TDABC [24]. However, table 1 of that study associates maintenance of INR 3,529,849.90 with INR 0.15 per examination,

whereas dividing by the 13,308 annual examinations would give about INR 265.24. The 20 minutes per examination cannot be reconciled with the 124,800 annual minutes in table 4, and laundry accounts for about 91% of ABC indirect and intermediate costs without justification. As these discrepancies are not explained, the study serves as a critical illustration: its amounts are not used as reference costs.

The review of digital TDABC applications compares heterogeneous groups and US applications of the same software; all authors report employment with the vendor [25]. Greater granularity or a larger sample size establishes neither the accuracy of costs nor causal savings; acquisition, maintenance and integration costs must be examined locally.

Two 2026 publications, consulted as previews only, complement this theme. Boogmans and colleagues extend TDABC to an enhanced recovery pathway after hip and knee arthroplasty [26]; the complication-free pathway described cannot be generalised to all patients. Yoon and Rhee analyse the citation trajectories of TDABC as decision infrastructure [27]; its effects on governance remain to be demonstrated empirically.

3.8.3 Allocation of Shared Overheads and Hospital Accounting

The qualitative study by Chugh and colleagues, based on eleven interviews in India, highlights organisational barriers to producing costs: limited technical capacity, weak standardisation and reluctance to share data [28]. It invites documentation of data-collection responsibilities, skills and controls before choosing a method. Network sampling and the heterogeneity of facilities limit the generalisability of these institutional conditions.

The Spanish Hospital Cost Network (RECH) gathers episode-level data from 34 hospitals; the cumulative database held 4,788,080 episodes at the end of 2021, covering about 11% of national health system episodes for that year [29]. Full cost combines top-down allocation of overheads, bottom-up attribution of resource use and activity drivers, notably time-based ones. Clinical coding and cost components are harmonised, with checks of format, consistency and outliers.

The RECH scope is limited to the admission–discharge window and excludes earlier and later consultations [29]: it describes a stay, not a complete pathway or a societal cost. The network relies on voluntary participation, and costs outside the range of 200 to 184,000 euros are excluded, which affects the distributions of very complex episodes. A comparison must retain diagnosis, procedures, length of stay, year and scope; a difference in means does not by itself measure efficiency.

A synthesis of 196 studies published between 1980 and 2022 distinguishes five roles of hospital management accounting systems: monitoring objectives and variances, exchanges between actors, shaping organisational values, political use and symbolic use [30]. These roles evolve with the relationships between authorities, managers, professionals, accountants and patients. The corpus, based on English-language journals selected by ranking, under-represents developing countries and does not measure a causal effect of accounting on costs.

Marques and Alves analyse 172 publications on hospital costing methods [31]. The frequency of ABC applications in their corpus reflects publication choices rather than general superiority; the restriction to English-language texts and two databases limits coverage, and the periods stated in the flow chart and in the results differ. Kamburov distinguishes the direction of allocation, top-down or bottom-up, from the level of detail, micro-costing or gross-costing [32]; his contribution is conceptual (text in Bulgarian, English abstract).

The review by Tatari and colleagues, covering 124 studies of dental care, examines shared overheads and allocation rules [33]. Cost definitions are heterogeneous and the quality of primary studies is not formally assessed. The protocol describes conversion into US dollars, adjustment for US inflation and then conversion by purchasing power parity: a common display currency does not ensure economic comparability. Our grid records separately the price year, index, exchange rate, parity factor and their order of application.

The review by Jacobs and colleagues stresses the heterogeneity of hospital cost calculations and the lack of description of the items included [34]; associations with length of stay, diseases or interventions remain descriptive. The analysis of five Iranian centres combines microcosting with data envelopment analysis [35]; its relative frontier and small sample do not allow the gaps to be translated into achievable budget savings. Evaluations of health system strengthening extend this reflection to shared resources and to trade-offs between precision, realism and generalisability [36].

3.8.4 Unit Costs, Currency Conversion and Implementation

The comparison of 41 documents from 26 European countries by García-Mochón and colleagues highlights the heterogeneity of recommendations for calculating direct costs [37]. Used on the basis of its abstract and publisher's record, this source is not used to attribute a detailed recommendation to any country. Its print publication dates from 2022, after online publication in 2021.

Berger and colleagues present 22 reference unit costs for Austria at 2019 prices, within the European PECUNIA project [38]. Their method distinguishes identification, definition, measurement and valuation of resources; tariffs are second-best approximations, used when better data are lacking, and the level of certainty varies by source. The publication year (2024) therefore differs from the price year (2019). For Morocco, the method can guide local data collection, but the Austrian amounts are not transferable as such.

The development of the PECUNIA Resource Use Measurement (RUM) instrument separates the multi-sectoral measurement of resource quantities from their valuation [39]. The cognitive interviews described by Janssen and colleagues examine understanding of questions, recall and formulation of answers [40]; they inform comprehension, not the accuracy of reported expenditure. The Modular Resource-Use Measure (ModRUM) pilot, conducted with 100 respondents in five English practices, shows agreement with records that varies by item, without random allocation of the short and detailed versions [41]. Any instrument requires linguistic and cultural adaptation and an examination of missing data by resource category.

PECUNIA work on unit costs shows that differences in service definitions, activity denominators and allocated overheads persist after currency conversion [42–44]. The Reference Unit Cost (RUC) templates are top-down valuation tools, distinct from TDABC. Their development and the Spanish tests document feasibility, but comparators are lacking for several services and some education items remain incomplete [43,44]. A value based on a tariff or a budget must be flagged as such.

The review of microcosting of genomic sequencing retains seven studies published between 2016 and 2022, from a search completed on 30 March 2022 [45]. Amounts are harmonised in 2021 US dollars, but the authors refrain from a representative mean because of the heterogeneity of procedures. Equipment utilisation rates range from 50% to 90%; maintenance, overheads and negotiated prices are unevenly documented, and six of the seven studies include a sensitivity analysis, generally deterministic. Monetary harmonisation therefore leaves differences in technology, scope and capacity in place.

The genomic microcosting protocol by Mordaunt and colleagues combines bottom-up and top-down measurements; it does not yet provide results and excludes some central or start-up costs [46]. Implementation guides recommend distinguishing the resources used for set-up, operation, research and replication of a programme [47]. The community application by Roy and colleagues includes in-kind contributions; its amounts are expressed per target population rather than per participant served, and inconsistencies between tables limit their use as reference parameters [48].

The distinction between financial and economic cost (section 3.2) has practical consequences [4,49]: depending on the context, the economic cost may exceed, equal or fall below the financial cost, and reducing it does not necessarily produce cash savings. The Kenyan vaccination study illustrates the role of doses administered and existing resources in planned scenarios, distinct from actual expenditure [50]. The Lebanese case shows the need to separate price year, inflation, exchange rate, purchasing power parity and discounting; its subsidy scenarios are sensitivity analyses, not confidence intervals [51].

3.8.5 Reporting, Statistical Analyses and Uncertainty

The review of costing methods for antibiotic-resistant infections sets out the data-collection requirements of microcosting and the dependence of aggregated approaches on the quality of secondary data [52]. It leads to comparing methods according to the objective, available data and items covered: a detailed method does not by itself ensure completeness or transferability.

The review by Bjorvig and colleagues notes incomplete descriptions of quantities, unit values and uncertainty in evaluations of remote monitoring, all from high-income countries [53]. Its transferability to Morocco must therefore be assessed component by component. It also recalls a terminological distinction: a facility's shared overheads (administration, infrastructure) differ from the productivity losses of patients and caregivers, and their classification depends on the perspective.

Two publications were consulted as abstracts. The review by Shaaban and colleagues, published in print in 2022 after online publication in 2021, covers 70 cost studies of

surgical site infections [54]; it reports mainly hospital coverage and limited transferability. Christou and colleagues propose a framework for costing surgery that distinguishes the assignment of direct resources from the distribution of overheads and support services [55]. Their detailed criteria are not reproduced without access to the full text.

The TDABC consensus proposes 32 items, 21 mandatory and 11 suggested, to structure reporting; this 2020 text is a foundational source predating the recent window [56]. The checklist by Schnitzler and colleagues comprises 17 questions for cost-of-illness studies [57]. These tools guide critical reading; they do not validate amounts and do not justify an overall score. They were not applied to the 8,513 records of the register.

The cardiovascular and oncology reviews note omissions of practical capacity, time, overheads or segments of the pathway [58,59]; the oncology review of 59 studies finds no coverage of the full cycle of care. The review by Shakya and colleagues distinguishes 25 partial analyses and 7 full economic evaluations [60]. Its non-applicable items are credited, whereas other checklists exclude them from the denominator: scores are not directly comparable. As the corpora of these reviews may overlap, their counts are not added together.

The tutorials by Zhou and colleagues and by Ben and colleagues use synthetic data to illustrate cost modelling and the economic analysis of trials [61,62]. The choice of a model family and link function depends on diagnostics; zeros may justify a two-part model, and multiple imputation relies on explicit assumptions about missing data. These examples illustrate methods and do not provide transferable coefficients.

Patel's narrative review makes explicit a targeted search and a purposive selection of cases, without aiming at exhaustiveness [63]. It sheds light on perspective, equity and uncertainty in funding decisions, without proposing a hospital costing method. The cost-effectiveness ratio and net monetary benefit require explicit conditions of comparison, and a foreign threshold cannot automatically be transposed to Morocco.

The multicentre HOPExt trial, on hypothermic oxygenated perfusion (HOPE) of grafts, applies micro-costing to liver transplantation [64]. The comparison adopts a hospital perspective over 12 months, in inflation-adjusted 2023 euros. The HOPE procedure includes consumables, staff time, depreciation and maintenance; follow-up includes hospitalisations, consultations, laboratory tests and imaging. Mean costs are €77,987.54 with HOPE and €72,748.50 in the control group, a difference of €5,239.04 (95% confidence interval −3,275.81 to 13,169.68; 131 patients per group), estimated with 10,000 bias-corrected and accelerated bootstrap replications. As the interval includes zero, this result establishes neither equivalence nor a cost difference. The specific cost of HOPE, €5,629.62, is already included in the initial hospitalisation: adding it a second time would create double counting.

3.8.6 Indirect Costs, Caregivers and Financial Protection

The review by Kitschen and colleagues examines 45 studies of three chronic conditions in children, adolescents and young adults [65]. It distinguishes losses of paid work, unpaid work, presenteeism and consequences for caregivers, with heterogeneous valuation methods. Without quality assessment or comparison of amounts, it does not quantify the effect of an omitted item. Its contribution is to separate the measurement of lost time from its valuation and to specify the person concerned.

The review by Setiawan and colleagues identifies 281 studies in low- and middle-income countries; 58% do not specify their approach to valuing productivity losses [66]. The 312 uses of methods identified do not correspond to 312 independent studies. The review by Das and colleagues distinguishes 38 publications and 31 datasets on informal care after stroke [67]; the heterogeneity of aggregated time rules out its direct use as a Moroccan parameter. Care time, simultaneous activities, lost income and replacement cost must be distinguished to limit double counting.

The inventory by Schmidt and colleagues covers 817 US articles and adopts a broad definition of costs borne by patients and caregivers, including insurance premiums, payments and loss of income or savings [68]; these categories go beyond out-of-pocket health payments in the standard sense. The review by Giombi and colleagues retains 166 studies, 121 of them on cancer, distinguishes material and psychosocial consequences and coping behaviours, and identifies 29 instruments, 19 described as validated, without formal assessment of risk of bias [69]. Financial toxicity scores complement monetary costs as distinct measures.

Nguyen and colleagues compare the budget-share and capacity-to-pay approaches [70]. Their thresholds depend on the resources used as the denominator, essential needs and the expenditure included. The Ethiopian example, based on aggregated means, illustrates payment

thresholds, not the prevalence of affected households. Low expenditure may reflect forgone care; impoverishment and productivity losses are complementary dimensions.

Ataguba and colleagues propose a service-specific catastrophic expenditure threshold [71], given by Equation (2):

$$z_k = \alpha_k \times z \quad (2)$$

where α_k is the share of service k in total out-of-pocket health expenditure at population level and z the overall threshold. The application to the 2008–2009 Nigerian survey covers five groups of services and an expenditure file of about 35,000 households. The results depend on these shares: lowering the threshold mechanically increases classifications, without independently validating financial hardship. This proposal enriches the discussion without constituting a universal standard.

The community protocol by Matos Fialho and colleagues plans a one-year societal evaluation: development and implementation of the intervention, health care use, physical-activity-related expenditure and productivity losses [72]. The latter are valued with the human capital approach, and participants' time is examined in sensitivity analysis according to its opportunity cost. Quality-adjusted life years (QALYs) are based on the EQ-5D-5L with a German value set, and health care use is self-reported retrospectively over six months. This protocol describes a planned method; non-randomisation, recall bias and the short time horizon will limit inference.

3.9 Application to the Moroccan Context

3.9.1 Disease Models and Health Programmes

The available Moroccan studies fall into three complementary categories: disease models, programme analyses and studies on financing. Reading them together shows the importance of defining the scope of costs and their use in decision-making.

Bennis and colleagues study the costs of diagnostic tools for cutaneous leishmaniasis in 40 facilities [73]. The comparison relies on professionals' differing experience with microscopy and rapid tests. The amounts relate to the data and prices of the study period, and discrepancies between abstract and tables call for relying on the detailed definitions. Their normalised benefit–cost indicator differs from a conventional monetary cost–benefit analysis.

A model of the burden of breast cancer in Morocco distinguishes medical costs by stage, production losses and an additional transport scenario [74]. It illustrates the value of breaking down resources before national extrapolation. Some quantities and probabilities are normative or reconstructed and some prices come from reference tariffs: the label of microcosting therefore does not imply that all costs were observed in patients. Caregivers are excluded from the central result for lack of specific durations, and international utilities stand in for a Moroccan measurement. The estimate is presented as partial, neither fully societal nor lifetime; years of life lost (YLL) and QALYs remain health measures, not added to monetary amounts.

A review of vaccine economics in Morocco extends the reasoning to the total cost of the programme: purchase of doses, transport, cold chain, staff, administration and surveillance [75]. It distinguishes the price of a product, the cost of delivering it and the budget impact of its introduction; a cost-effective intervention may exceed the available resources. A neonatal and perinatal review highlights the family and psychological burden [76]; it does not value parental distress in Moroccan currency, and the international estimates it cites are neither national parameters nor additional independent observations.

The review of seventy years of the National Immunisation Programme provides complementary epidemiological context [77]. It stresses that the introduction of more expensive vaccines increases needs for financing, cold chain and logistics, and calls for a dedicated economic evaluation. Cases and deaths averted will have to rely on comparable indicators and reliable surveillance before being translated into an economic model.

A conceptual framework on the vaccine supply chain proposes evaluating separately current practice, digitisation alone and digitisation combined with artificial intelligence analytics [78]. This comparison makes it possible to attribute costs and effects to the added technology, provided that acquisition, integration, connectivity, training, cybersecurity and maintenance are distinguished over a common time horizon. Logistic criteria, such as the cost per usable dose delivered, require an additional model to be translated into health gains. This framework remains conceptual and does not establish savings attributable to artificial intelligence in Morocco.

A study of 1,787 notifications of poisoning by drugs and psychoactive substances received by the Moroccan Poison Control and Pharmacovigilance Centre (CAPM) between 1980 and 2008 combines toxicovigilance data with a parameterisable economic model [79]. Lengths of stay are reported for only 51 cases; the illustrative amount of

US$280,559 results from multiplying the 1,787 episodes by a published paediatric cost of US$157 and does not measure historical expenditure. The model makes the items explicit (care, production losses, mortality, justice, quality of life), but its parameters require dedicated data collection and its prognostic component external validation. The review on generic medicines distinguishes unit prices, volumes consumed and out-of-pocket payments, based on an initial bibliographic screening [80]. The documentary study on Morocco's Compulsory Health Insurance (AMO) distinguishes administrative coverage, effective entitlements and financial protection; its international comparisons are descriptive, its growth rates nominal, and its 150 reconstructible PubMed identifiers (PMIDs) do not constitute deduplication of the 991 occurrences reported [81].

A study of two cervical cancer screening cohorts describes activity-based allocation and a comparison with vaccination [82]. Its interest is methodological. The text juxtaposes annual overhead expenditure and individual amounts, then extrapolates to a population of women without making all disease probabilities and time horizons explicit. Comparing a curative cost with a vaccine price does not constitute a cost-effectiveness analysis: a reconstruction of denominators, flows, units and the counterfactual is required before any use of the amounts.

3.9.2 Hospital Studies

Benabdallah and Jellouli apply top-down allocation of overheads to the oncology department of the Hassan II University Hospital (CHU) in Fez, using 2021 data [83]. The cost of 323.75 Moroccan dirhams (MAD) per chemotherapy procedure excludes medicines and consumables directly attributable to the patient: it represents the cost of a procedure, not of a treatment. Relative value units combine time and complexity as assessed by professionals. The totals of the two units in table 3 of that study reach MAD 8,477,463.59, against MAD 7,691,929.14 in table 2, with no explanation of the difference in the document consulted.

Akhnif and colleagues build a database from 39 hospitals and 2019 data, then combine unit costs and volumes to estimate the 2023 financing need [84]. This bottom-up estimate relies on costs by activity centre and overhead allocation, distinct from individual microcosting, and constitutes a modelled need rather than observed expenditure. The sum of the eight cost lines in table 6 of that study reaches US$543.65 million, against US$814.27 million in the displayed total; this discrepancy calls for clarification without calling into question the organisational value of the approach.

3.9.3 Summary of Lessons

Table 6 summarises, for each theme, the references used, the main lesson and the check point retained for a review of medical costs.

Table 6: Thematic synthesis of the publications analysed

Theme	References	Main lesson	Check point
Scope, perspective and nature of values	[16–18]	Provider cost, tariff, reimbursement and household payment measure different objects	Name the perspective and the nature of each amount
Practical capacity, time and TDABC	[19–27]	The cost per minute depends on the capacity assumed and the source of durations	Extract capacity, observed or self-reported times and activities covered
Allocation of shared overheads	[28–36]	Allocation rules and episode scope explain part of the differences between facilities	Document cost centres, allocation keys and reconciliation of totals
Unit costs, conversion and implementation	[37–51]	Currency harmonisation leaves differences in service definitions and denominators in place	Record price year, index, exchange rate, purchasing power parity and order of application
Reporting and uncertainty	[52–64]	Checklists guide reading without validating amounts; a confidence interval including zero does not establish equivalence	Distinguish sensitivity analysis from confidence interval
Indirect costs, caregivers and financial protection	[65–72]	Time measurement, valuation and catastrophic expenditure thresholds vary widely	Separate lost time, valuation and the person concerned
Moroccan context	[73–84]	Studies combine observed costs, tariffs and modelled parameters; several totals remain to be reconciled	Classify each parameter: observed, reconstructed or modelled

3.10 Teaching Example in Dirhams

The following example is entirely fictitious. It illustrates an episode of care observed within a defined scope, without representing a particular disease, an official tariff or Moroccan practice. Items are assumed to be distinct. The daily cost here covers accommodation and routine care, excluding outpatient consultations, tests, imaging and medicines listed in the other lines. Unit values are assumed to already include their relevant shared overheads. Table 7 details the calculation.

Table 7: Illustrative calculation of the medical cost per episode

Item	Quantity	Unit value (MAD)	Total (MAD)
Outpatient consultations	4	200	800
Laboratory tests	3	150	450
Imaging	1	700	700
Inpatient days	5	300	1,500
Medicines for the episode	1 batch	650	650
Total medical cost	—	—	4,100

The illustrative medical cost is MAD 4,100. If, within an illustrative societal scope, MAD 200 for transport, MAD 300 for a caregiver's time and MAD 1,000 for the patient's lost production are added, the broader total reaches MAD 5,600. The caregiver's time and the patient's production are assumed to be distinct, so as not to value the same loss twice. The amount of MAD 5,600 must not be labelled "medical cost".

If only the value of an inpatient day varies from MAD 240 to MAD 360, all other items remaining fixed, the medical cost varies from MAD 3,800 to MAD 4,400. This is a deterministic sensitivity range, not a confidence interval. The example shows how a valuation convention changes the result without any change in the clinical pathway.

4. DISCUSSION

4.1 Contributions of Medicine, Economics and Management

The medical component remains essential for interpreting costs. An increase may reflect complications, improved access, appropriate intensification of treatment or price changes; these explanations are not interchangeable. Management can make durations, equipment and capacity use visible. Economics helps link these elements to the decision question. A review becomes more useful when it makes these relationships explicit and indicates the data needed to distinguish between them.

The work of Post and colleagues invites the construction of an explanatory contribution [3]. Jaakkola presents several forms of conceptual research and stresses the need for an explicit theoretical choice [7]. These references inform how to build a framework, without being guides to measuring medical costs. The contribution proposed here is to link a clinical event, resource use, valuation and interpretation, while keeping track of the assumptions made at each step.

Figure 2 translates this articulation into a six-step appraisal framework. Each step associates a question with a check point drawn from the synthesis: defining the object and perspective; describing the clinical pathway; measuring quantities; valuing resources; allocating shared overheads; interpreting uncertainty and transferability. Appendix A details the corresponding extraction fields.

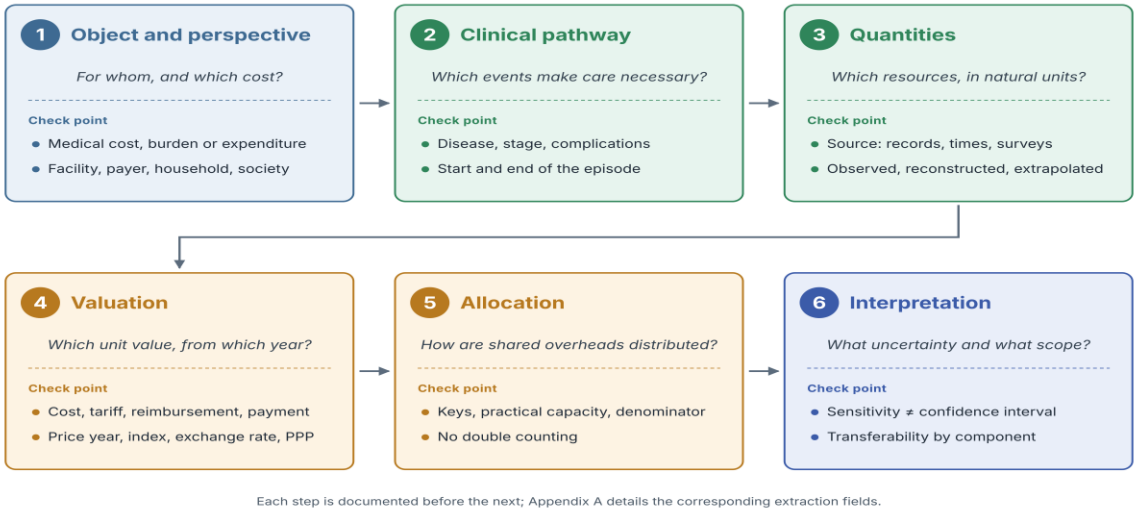


Figure 2: Six-step framework for appraising an estimate of medical costs

4.2 Strengths of the Narrative Review for Cost Studies

The narrative review facilitates bringing together documents that are often separate: medical publications, economic studies, process descriptions and accounting standards. It allows discussion of heterogeneity that cannot always be reduced to a numerical difference. It can also prepare data collection by identifying forgotten items and conventions to be defined. Its contribution is then to make the future estimate more understandable and better targeted; it does not by itself provide the missing data.

A thematic plan can successively compare populations, pathways, perspectives and valuation methods. The authors thereby maintain the link between clinical and economic considerations. Conversely, a succession of summaries by publication risks concealing that two amounts bearing the same name do not represent the same object. Tables should serve to make these differences visible, not merely to inventory studies.

4.3 Limitations and Risks of Interpretation

Purposive selection is exposed to the authors' preferences and to the availability of texts. Published hospital studies do not necessarily cover untreated patients, care outside facilities or breaks in the pathway. Variable definitions of severity, complications and costs limit comparisons. Currency harmonisation corrects neither these differences nor differences in data quality. A synthesis must therefore accept that some estimates remain presented separately.

Quality of writing does not prove the validity of a calculation. SANRA supports the appraisal of the objective, search, referencing and reasoning of a narrative review [6]. CHEERS 2022 concerns the reporting of economic evaluations, including some cost analyses, but is not designed to produce a score of methodological validity [15]. A cost review must state which elements it examines and avoid turning these tools into general certification.

The bibliographic re-examination illustrates a limitation of lexical screening: economic vocabulary does not guarantee a cost estimate, while a measurement of resources may be relevant without a monetary amount. A length of stay, a quality-of-life score or an incidence rate is not in itself a cost. The SCREAM cohort analyses clinical and hospitalisation risks without a monetary estimate [85]; a review on immunonutrition announces the extraction of hospital costs without presenting a quantitative synthesis [86]. A reduction in length of stay is therefore not sufficient to demonstrate savings.

4.4 Implications for a Study in Morocco

For a Moroccan application, the review should distinguish care sectors, paying bodies, household payments and facility resources. The source of a value must be named: hospital accounts, medicine purchases, billing, reference tariff, reimbursement or survey. These sources inform different objects; their fit with the chosen perspective must be discussed. No tariff rule or national value is presumed in this manuscript.

The transferability of a foreign estimate should be examined at the level of its components. Quantities of care may depend on pathways, technical availability and stage at diagnosis. Values may depend on salaries, purchases, capacities and conventions. When the information exists, it is therefore preferable to examine resources and their prices separately rather than converting only a total. The GHCC focuses mainly on the costs of service delivery; access transport and productivity losses require a complementary framework [13].

These comparisons support a progression based on traceability: define the perspective and the cost object; check resources, keys and denominators; reconcile totals; then test assumptions on volumes and transferability. Cost differences between facilities may reflect capacity, activity, severity, quality and teaching missions before indicating inefficiency. Likewise, the economic value of prevention must be assessed for a defined intervention and comparator.

International comparison suggests two complementary conditions [29,30]. The first is technical: a common dictionary of episodes, resources, drivers, price years and allocation rules, with reconciliation of accounting totals and data checks. The second is organisational: involving professionals in building and interpreting indicators, and specifying the decisions they serve. A standardised system may remain a compliance tool if the data are neither discussed nor used. For Morocco, a pilot network of facilities could test these conditions before any generalisation; this is a proposal arising from the present synthesis, with no national effectiveness yet demonstrated.

For a Moroccan hospital study, a stepwise strategy is proposed: start by reconciling annual expenditure with activity volumes, investigate high-contribution items in depth through micro-costing or time measurement, and then examine the assumptions that most influence the results. Scenarios may concern activity volume, practical capacity, purchase prices and incomplete care. This proposal draws on the principles of cost transparency and prioritisation of uncertainty [4,5]; it remains to be tested on local data.

4.5 Scope of the Complementary Readings

The complementary readings show that the granularity of a method does not guarantee the validity of the amount produced [22–24,45,63]. Critical appraisal must check the consistency between expenditure, volumes, times and unit costs, and then distinguish the resources actually recorded from omitted items. Methodological reviews and primary studies whose corpora overlap are not independent observations.

Recent readings outline a three-step approach applicable to Morocco: make the pathway and resources explicit, build unit costs adapted to the context, then assess separately the effects for facilities, households and caregivers [39,41,42,66,70]. The PECUNIA and ModRUM instruments can guide local data collection after adaptation; foreign amounts, expenditure shares and thresholds remain starting points to be validated. The chosen perspective must remain consistent with the objective of the study, distinguishing production cost, budgetary burden, out-of-pocket payments and psychosocial consequences.

The two recent applications confirm that the scope and status of the data are decisive [64,72]. A hospital perspective excludes productivity losses and household time; a societal perspective must make their measurement and valuation explicit. In HOPExt, the one-year horizon and French hospital prices limit extrapolation to the long term and to Morocco. The Matos Fialho protocol illustrates planning, to be distinguished from a demonstration of efficiency.

4.6 Limitations of This Manuscript and Further Work

The synthesis relies on a targeted narrative selection, exposed to availability bias and to the authors' interpretive choices. The re-examination covered 375 negative orientations and not all 8,513 rows; the 8,121 orientations to full text are neither documents obtained nor included studies. The absence of independent double screening and of formal quality assessment of all sources limits the scope of the conclusions. The truncation hospital* may have retrieved non-health records (hospitality), which were excluded at pre-screening. References consulted only as abstracts or with incomplete metadata are flagged and do not support detailed results.

Extending this synthesis will require complete screening of the register records, validation of decisions by the authors and homogeneous critical appraisal of the texts obtained. Non-retrieval of some documents may introduce availability bias. Protocols will be distinguished from studies with results; non-valued resources from monetary estimates; and publications from the same trial will be matched before synthesis. The search strings and the completeness of exports will have to be checked before any claim of exhaustiveness. A search of EconLit could complement the economic component. The present contribution remains a methodological narrative synthesis and not a completed systematic review.

The complementary search of 24 November is not a systematic update of the initial databases. It does not allow conclusions about the exhaustiveness of the literature available at that date. The two additional references strengthen the conceptual framework without changing the numerical results of the initial search.

CONCLUSION

The narrative review can help in understanding the estimation of medical costs by linking clinical reality to economic and managerial choices. Organised according to IMRAD and by theme, it identifies scope, assumed capacity, allocation rules and price year as important sources of discrepancy between estimates, without establishing their quantitative ranking. The proposed six-step framework and extraction grid make it possible to read a published study and to prepare data collection, particularly in Morocco, without replacing the data needed for the calculation. The quality of the analysis relies on an explicit scope, the separation of quantities and values, the identification of sources and a discussion of uncertainties; the medical component remains indispensable for distinguishing low expenditure, unmet needs and efficiency.

APPENDIX A. PROPOSED GRID FOR A REVIEW OF MEDICAL COSTS

For each study, record the reference and country; the disease and its definition; stage or severity; population and sample size; care sector; perspective; time horizon; incidence or prevalence approach; cost unit; items included and excluded; measurement method; sources and year of values; allocation rules; handling of missing data; results with their dispersion; sensitivity analyses; clinical, economic and managerial limitations.

The synthesis should then classify discrepancies according to their origin: differences in population, care use, resources, unit value, perspective or method. This grid is a working proposal; it is not a validated instrument and should not be converted into a score without methodological development.

Additions to the extraction grid

Nature of the monetary value: distinguish production cost, tariff, reimbursement, invoice and actual patient payment;

specify the source and its fit with the perspective. A tariff amount used as a proxy must be identified as such.

Shared overheads: list items included or excluded, cost centres, the allocation base (time, floor area, activity or other), its justification, the denominator and capacity assumptions. Check that the same overheads are not already included in unit values. From a hospital production perspective, separate these overheads from productivity losses and caregiver time.

Conversion and transferability: keep the original currency and year, the inflation index and its country, the exchange rate and its date, the purchasing power parity factor and the order of operations. Discuss separately differences in quantities of care, prices, pathways and access.

Consultation status: note full text, accessible sections or abstract only; keep the passages and tables supporting each item of information. Undocumented fields remain blank and are not imputed from another study.

Timing and validation of unit cost: distinguish publication year, date of online publication, data-collection period and price year. Record external checks, representativeness of the source and use of tariff proxies; do not interpret the availability of a reference cost as validation of its transferability.

Pathway scope: record the start and end of the episode, care before admission or after discharge, use of services outside the facility and items explicitly excluded. Distinguish the cost of a stay, the cost of a pathway and the cost of illness.

Practical capacity: record the annual cost of the resource, the volume of available time, deductions made and the source of durations. Separate observed, self-reported and normative times; examine risks of double counting administrative tasks and shared overheads.

Patient and caregiver time: identify the person concerned, the activity lost, the duration, the measurement source and the unit value. Distinguish paid work, unpaid work, absenteeism and presenteeism. Document the human capital approach, friction costs or any other valuation convention.

Comparison of methods: check that populations, periods and items covered are identical before interpreting differences. A lower estimate is not enough to conclude greater efficiency or better validity.

Resource measurement and financial protection

Document the version and language of questionnaires, recall period, items checked against records, missing data, in-kind contributions, implementation costs and overlaps between publications. For households, separate payments net of reimbursements, insurance premiums, lost income and psychosocial scores; for catastrophic expenditure, specify the numerator, denominator, period, threshold and sensitivity analyses. A reporting score is not a measure of economic accuracy.

Uncertainty: record structural assumptions, parameters and methodological conventions separately; note the ranges tested, their justification, results by scenario and the determining factors. Specify whether the distributions used are based on observations or assumptions. Do not interpret a sensitivity range as a confidence interval.

APPENDIX B. CORRESPONDENCE WITH THE SANRA CRITERIA

Table 8 positions the elements of the manuscript against the six criteria of the SANRA scale [6]. It facilitates appraisal by authors and reviewers; no score is assigned.

Table 8: Correspondence of the manuscript with the SANRA criteria

SANRA criterion	Elements of the manuscript	Sections
1. Justification of the article's importance for the readership	Interdisciplinary stakes of measuring medical costs; data needs in Morocco	1 ; 4.4
2. Statement of concrete aims or formulation of questions	Explicit guiding question and aim	1 ; 2.1
3. Description of the literature search	Databases, window, dates, 34 search strings (S1), consolidated register and Figure 1	2.2 ; 3.1.1 ; S1
4. Referencing	Numbered references in the journal style; consultation status (full text, sections or abstract) indicated	2.3 ; 3.8 ; 3.9
5. Scientific reasoning	Distinction between observed, reconstructed and modelled costs; reconciliation of totals; scope of sources	3.7 à 3.9 ; 4
6. Appropriate presentation of data	Tables 1 to 8, Figures 1 and 2; currency and price year specified	3 ; 4.1

DECLARATIONS

Conflicts of interest. The authors declare no conflicts of interest. Some of the references analysed involve members of the team; they were examined with the same critical grid as the other sources. Funding. This research received no specific funding. No individual data were collected. The numerical

illustrations are fictitious and are not survey results. Supplementary material. S1: workbook of search strings, consolidated register and document tracking.

Author contributions (CRediT taxonomy).

Aida Soulaymani: lead author; conceptualisation, methodology, supervision, project administration, writing – original draft (lead), writing – review and editing.

Khaoula Jabari: investigation, data curation (bibliographic), formal analysis and synthesis of the literature, writing – original draft (supporting), writing – review and editing.

Ayoub El Assali: investigation, data curation (bibliographic), formal analysis and synthesis of the literature, writing – original draft (supporting), writing – review and editing.

Anas El Anssari: investigation, data curation (bibliographic), validation of extracted data and references, writing – original draft (supporting), writing – review and editing.

Use of artificial intelligence: artificial intelligence tools were used for literature searching, consolidation of exports, automated checking of the register and verification of calculations. The authors checked the original sources, selection decisions, interpretations and references, and take full responsibility for the content. The bibliographic and editorial supplement of 24 November 2026 was also prepared with artificial intelligence assistance, under the authors' supervision. The English translation was prepared with artificial intelligence assistance and reviewed by the authors.

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