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QALY AND DALY IN HEALTH EVALUATION: FOUNDATIONS, APPLICATIONS, AND CONTRIBUTIONS TO HEALTH SYSTEMS MANAGEMENT

QALY E DALY NA AVALIAÇÃO EM SAÚDE: FUNDAMENTOS, APLICAÇÕES E CONTRIBUIÇÕES PARA A GESTÃO DOS SISTEMAS DE SAÚDE

QALY Y DALY EN LA EVALUACIÓN EN SALUD: FUNDAMENTOS, APLICACIONES Y CONTRIBUCIONES A LA GESTIÓN DE LOS SISTEMAS DE SALUD

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ABSTRACT
The evaluation of health outcomes requires indicators that go beyond the isolated counting of procedures, disease cases, and deaths, incorporating both the quality and duration of life, as well as the losses resulting from disabling conditions. In this context, the Quality-Adjusted Life Years (QALY) and Disability-Adjusted Life Years (DALY) indicators offer distinct and potentially complementary perspectives. QALY combines the quantity and quality of life into a measure that expresses the gains associated with health interventions, whereas DALY estimates the burden of disease by adding the years of life lost due to premature mortality to the years lived with disability. This article aims to discuss the conceptual and methodological foundations of these indicators, compare their characteristics, and examine their contributions to health technology assessment, priority setting, and resource allocation in health systems. This is a theoretical study with a qualitative approach, conducted through a narrative

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literature review and documentary analysis. The analysis shows that, although based on different perspectives, health gains and health losses, QALY and DALY can broaden the understanding of health outcomes and support management decisions. However, their use requires careful consideration of methodological choices, the valuation of health states, social inequalities, and the ethical principles that should guide public policies.

Keywords: Health Economics. QALY. DALY. Health Technology Assessment. Health Management.

RESUMO
A avaliação dos resultados em saúde requer indicadores capazes de ultrapassar a contagem isolada de procedimentos, casos de doença e óbitos, incorporando tanto a qualidade quanto a duração da vida e as perdas decorrentes de condições incapacitantes. Nesse contexto, os indicadores Quality-Adjusted Life Years (QALY) e Disability-Adjusted Life Years (DALY) oferecem perspectivas distintas e potencialmente complementares. O QALY combina quantidade e qualidade de vida em uma medida que expressa os ganhos associados a intervenções em saúde, enquanto o DALY estima a carga de doenças mediante a soma dos anos de vida perdidos por morte prematura e dos anos vividos com incapacidade. Este artigo tem como objetivo discutir os fundamentos conceituais e metodológicos desses indicadores, comparar suas características e examinar suas contribuições para a avaliação de tecnologias, a definição de prioridades e a alocação de recursos nos sistemas de saúde. Trata-se de estudo teórico, de abordagem qualitativa, desenvolvido por meio de revisão narrativa da literatura e análise documental. A análise evidencia que, embora partam de perspectivas diferentes, ganhos em saúde e perdas de saúde, QALY e DALY podem ampliar a compreensão dos resultados sanitários e apoiar decisões de gestão. Entretanto, sua utilização exige atenção às escolhas metodológicas, à valoração dos estados de saúde, às desigualdades sociais e aos princípios éticos que devem orientar as políticas públicas.

***Palavras-chave**: Economia da Saúde. QALY. DALY. Avaliação de Tecnologias em Saúde. Gestão em Saúde.*

RESUMEN
La evaluación de los resultados en salud requiere indicadores que vayan más allá del recuento aislado de procedimientos, casos de enfermedad y defunciones, incorporando tanto la calidad como la duración de la vida y las pérdidas derivadas de condiciones incapacitantes. En este contexto, los indicadores Quality-Adjusted Life Years (QALY) y Disability-Adjusted Life Years (DALY) ofrecen perspectivas distintas y potencialmente complementarias. El QALY combina la cantidad y la calidad de vida en una medida que expresa las ganancias asociadas a las intervenciones en salud, mientras que el DALY estima la carga de enfermedad mediante la suma de los años de vida perdidos por muerte prematura y los años vividos con discapacidad. Este artículo tiene como objetivo analizar los fundamentos conceptuales y metodológicos de estos indicadores, comparar sus características y examinar sus contribuciones a la evaluación de tecnologías sanitarias, la definición de prioridades y la asignación de recursos en los sistemas de salud. Se trata de un estudio teórico, de enfoque cualitativo, desarrollado mediante una revisión narrativa de la literatura y un análisis documental. El análisis evidencia que, aunque parten de perspectivas diferentes, ganancias en salud y pérdidas de salud, el QALY y el DALY pueden ampliar la comprensión de los resultados sanitarios y respaldar las decisiones de gestión. Sin embargo, su utilización exige prestar atención a las decisiones metodológicas, la valoración de los estados de salud, las desigualdades sociales y los principios éticos que deben orientar las políticas públicas.

***Palabras clave:** Economía de la Salud. QALY. DALY. Evaluación de Tecnologías Sanitarias. Gestión Sanitaria.*



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1 INTRODUCTION

The evaluation of health outcomes has become an important component of health systems planning and management, particularly in the face of growing healthcare needs, the adoption of new technologies, and limited available resources. Assessing interventions cannot be restricted to identifying procedures performed or counting deaths and cases of disease. It must also consider the effects of actions on life expectancy, functional capacity, well-being, and quality of life.

The measurement of health-related quality of life gained prominence in the literature during the final decades of the twentieth century. This field encompasses diverse approaches and instruments, as health outcomes involve physical, psychological, social, and functional dimensions, as well as the preferences individuals assign to different health states. Incorporating these dimensions into assessments contributed to the development of measures capable of expressing outcomes in a common unit.

Among these measures are the quality-adjusted life year (QALY) and the disability-adjusted life year (DALY). The former seeks to measure health gains by combining length and quality of life; the latter estimates disease burden by aggregating losses associated with premature mortality and disability. Thus, although both relate length of life to health status, they do not represent the same phenomenon and should not be interpreted as interchangeable indicators.

The distinction between these perspectives is relevant to health economics and public management. While QALYs are used particularly in cost–utility evaluations of interventions, DALYs make it possible to quantify disease burden in populations and compare health losses across conditions, regions, and population groups. Considering both measures may support more comprehensive decisions, provided their conceptual and methodological differences are respected.

Accordingly, this article aims to discuss the conceptual and methodological foundations of QALYs and DALYs, compare the two measures, and examine their contributions and limitations in health technology assessment, priority setting, and resource allocation in health systems.

2 METHODOLOGICAL APPROACH

This theoretical study adopts a qualitative approach based on a narrative review of scientific literature and documentary analysis. The investigation drew on academic publications, studies, and technical documents concerning health economics, health technology assessment, and the measurement of health outcomes, emphasizing quality-adjusted life years (QALYs) and disability-adjusted life years (DALYs). The sources considered address the conceptual foundations of these indicators, their development, applications in different settings, and use as tools to support evaluation and decision-making in health systems.

The analysis followed a comparative framework organized into four main dimensions: (i) conceptual foundations, including the purposes and assumptions underlying each indicator; (ii) measurement procedures, considering methods used to estimate gains in quality and length of life for



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QALYs and health losses associated with premature mortality and disability for DALYs; (iii) areas of application, with attention to health technology assessment, intervention evaluation, priority setting, and resource allocation; and (iv) methodological and ethical limitations, including challenges related to health-state valuation, comparability of findings, social inequalities, and the possible effects of methodological choices on health decisions.

The analytical approach sought to identify similarities and differences between the indicators. Although both use a time dimension to express health-related outcomes, they proceed from distinct perspectives: QALYs focus on measuring health gains by combining quantity and quality of life, whereas DALYs estimate disease burden from years of life lost to premature death and years lived with disability. This distinction was the central axis of comparison, enabling discussion of both the potential complementarity of the indicators and the limits of their use in decision-making.

The study seeks to systematize and critically discuss the conceptual foundations, measurement procedures, and principal areas of application of QALYs and DALYs, comparing their characteristics, potential uses, and limitations. In doing so, it aims to improve understanding of their potential as tools for evaluating health outcomes, informing priorities, supporting resource allocation, and managing health systems.

3 QALY: QUALITY OF LIFE AND HEALTH GAINS

3.1 Conceptual foundations

The QALY is a health outcome measure grounded in utility theory that combines length of life with the quality of life experienced during a given period. Its purpose is to express the gains achieved through treatments, programs, or technologies in a common unit, allowing outcomes from different interventions to be compared. Each year lived in a particular health state is assigned a quality or utility weight; the measure therefore considers not only how many years are lived but also the conditions in which those years are experienced.

The development of this indicator is linked to debates on comparing outcomes and setting priorities in healthcare. Klarman applied the concept in a 1968 study of chronic kidney failure, while Zeckhauser and Shepard used the term “quality-adjusted life year” in 1976 to denote a unit combining length and quality of life, according to the historical account provided by Nord (1999).

Health-related quality of life encompasses individuals’ perceptions of relevant aspects of their health status, including physical functioning, psychological and emotional dimensions, mobility, pain, cognitive functioning, and self-care. Assessment incorporates preferences and judgments concerning different health states, making the indicator useful while also raising questions about interpersonal comparisons of utilities.



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3.2 Measurement and utilities

Measuring QALYs requires assigning values to health states. Ordinal utilities allow states to be ranked according to individual preferences, indicating which are regarded as more or less desirable. Cardinal utilities, by contrast, assign numerical values representing the relative intensity of these preferences and permit their incorporation into calculations of health gains.

Procedures described in the literature include the rating scale, on which health states are positioned along a preference scale; the standard gamble, which uses choices under uncertainty; and the time trade-off (TTO), which considers trade-offs between length and quality of life. The person trade-off, in turn, explores choices between groups of people in different health states and explicitly introduces questions of priority and perceived deservingness (Ferreira, 2003).

The choice of method and respondents influences the values obtained. Researchers must identify and describe the health states being assessed, establish whether they are temporary or chronic, and appropriately select respondents, who may include people living with the condition, healthcare professionals, managers, and members of the general public. Values taken from previous studies should be used cautiously, particularly regarding the comparability of health states and the reliability of the instruments.

Operationalizing QALYs involves two related but distinct stages: measuring health-related quality of life and valuing health states. The first identifies how a condition affects relevant dimensions of everyday life; the second assigns a preference value to each described state. This distinction matters because an instrument may adequately capture functional limitations, pain, or anxiety without itself yielding a utility measure suitable for QALY calculations. Measurement quality depends on validity, reliability, responsiveness to change, and suitability for the population studied.

The utility assigned to a health state is usually expressed on a scale anchored at two reference points: 1 represents full health and 0 represents death. Some states may receive negative values when they are considered, under the adopted valuation system, worse than death. Such values do not imply that a person’s life has negative worth; they express only a conventional assessment of health-related quality of life on a particular scale. Interpretation must therefore distinguish the technical measure from a person’s dignity and intrinsic worth.

In operational terms, QALYs are calculated by combining time spent in each health state with its corresponding utility. If a person spends one year in a state with a utility of 0.7, that period amounts to 0.7 QALYs. If health status changes during follow-up, the calculation incorporates the different periods and their respective weights and may be represented as the area under the utility-over-time curve. In long-term evaluations, models may estimate health trajectories beyond the period observed in clinical trials, provided extrapolation assumptions are explicitly stated and justified.

Comparing alternatives requires attention to incremental gains rather than merely the total QALYs in each group. The economic outcome may be expressed as the incremental cost–utility ratio, which relates the difference in costs between a new intervention and its comparator to the difference in



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QALYs gained. This ratio indicates the additional cost per additional unit of health benefit. Its interpretation depends on the decision-making context, available budget, existing alternatives, and opportunity cost. A ratio alone does not determine whether a technology should be adopted, as the decision also involves budget impact, magnitude of benefit, uncertainty, and distributional consequences.

Uncertainty is inherent in cost–utility evaluations. It may arise from variability in clinical data, utility estimates, costs, duration of effects, and model structure. Deterministic sensitivity analyses examine how results change when particular parameters take alternative values; probabilistic analyses consider probability distributions for multiple parameters. Presenting intervals, scenarios, and acceptability curves, where appropriate, makes it possible to assess the robustness of conclusions and prevents point estimates from being interpreted as certainties. Transparency about data sources and assumptions is essential for critical appraisal.

3.3 Applications and limitations

One of the principal applications of QALYs is cost–utility analysis, which relates the incremental costs of an intervention to additional QALYs gained. A common measure allows treatments and programs producing different outcomes to be compared, supporting the evaluation of alternatives and priority setting when resources are limited.

However, use of the indicator entails limitations. Utility assignment depends on methods, scales, respondents, and value judgments. Moreover, comparisons between individuals can be controversial because health preferences and experiences are influenced by personal and social circumstances. Incorporating a numerical outcome into decision-making does not eliminate the need to assess context, opportunity costs, and the distributional consequences of a choice.

4 DALY: DISEASE BURDEN AND HEALTH LOSSES

4.1 Conceptual foundations

The DALY is a composite indicator designed to measure disease burden in populations by integrating mortality and morbidity information. Its development responds to the need to bring together, in a single measure, years of life lost due to premature death and years lived with disability resulting from diseases, injuries, or sequelae. It thus seeks to express the total health loss associated with different conditions.

The methodology was developed in the context of global burden of disease studies, with the involvement of the World Health Organization and the World Bank and technical coordination by Christopher Murray and his team. The proposal sought to generate comparable estimates across countries and populations, drawing on available epidemiological and vital statistics and integrating mortality and morbidity components (Murray, 1994).

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The DALY comprises two components: years of life lost (YLL) due to premature mortality and years lived with disability (YLD). In the formulation presented in the original chapter, the relationship is expressed as DALY = YLL + YLD. The greater the number of DALYs attributed to a condition, the greater the associated health loss in the population under consideration.

4.2 Components and measurement procedures

The YLL component estimates the difference between the age at death and a reference life expectancy. The YLD component considers the time lived with a given condition and a disability weight associated with the severity of the health state. Combining these components captures circumstances that would not be adequately represented by indicators focused solely on mortality.

Measurement requires information on the frequency, duration, and severity of health conditions, together with reference parameters for estimating losses. Disability weights seek to represent the reduction in health associated with different states. As described in the historical approach presented in the chapter, these weights were evaluated by expert groups and consensus procedures, including the person trade-off (Whitehead; Ali, 2010).

The YLL component is based on deaths and the number of years that, according to a standard life table, could potentially have been lived after the age at which each death occurred. In its basic form, the calculation multiplies the number of deaths at a given age by the remaining reference life expectancy at that age. Thus, the indicator does more than count deaths: it distinguishes deaths occurring at different ages and expresses lost life-years relative to a reference standard. The choice of life table affects the result and must be documented, especially when comparing countries, periods, and population groups.

The YLD component incorporates the nonfatal consequences of diseases and injuries. In general, it relates the frequency or prevalence of suboptimal health states to their respective disability weights. These weights range from 0, corresponding to full health, to 1, corresponding to a state equivalent to death, and represent the relative health loss associated with a condition. YLDs make visible conditions that may not directly increase mortality but cause persistent limitations, pain, suffering, and restrictions on social participation. They are therefore particularly relevant to analyses of chronic diseases, mental disorders, musculoskeletal conditions, and sequelae of acute illnesses.

Incidence-based and prevalence-based approaches must be distinguished. An incidence-based perspective estimates future losses associated with new cases arising during a given period, taking account of duration and severity. A prevalence-based perspective estimates the disability burden experienced by the population during a specified period, based on existing cases and corresponding weights. International methodologies have evolved, and different rounds of global burden of disease studies employ their own procedures; methodological descriptions should therefore identify the edition and parameters used. In contemporary estimates, the combination of sequela prevalence and disability weights is widely used to calculate YLDs (WHO, 2024).



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Adding YLLs and YLDs makes it possible to determine whether the burden of a condition arises predominantly from premature deaths, nonfatal consequences, or both. This decomposition has direct planning value. Where YLLs predominate, strategies may be needed to prevent avoidable deaths, ensure timely diagnosis, and improve access to effective treatments. Where YLDs are substantial, continuity of care, rehabilitation, psychosocial support, and disability prevention policies become particularly important. For many conditions, both components coexist and require integrated responses across the continuum of care.

DALY estimates also depend on the quality and completeness of information. Death records, surveillance systems, population surveys, medical records, disease registries, and epidemiological studies may differ in coverage and accuracy. In areas with underregistration or limited diagnostic capacity, estimated burden may not fully reflect reality. Statistical modeling helps fill gaps but does not eliminate uncertainty. Reporting uncertainty intervals and periodically updating datasets are important to prevent managers from interpreting small differences between locations as definitive epidemiological differences.

Aggregating results makes it possible to estimate disease burden by condition, region, or population, providing a broader epidemiological picture than cases and deaths considered separately. It also permits trends over time and differences between population groups to be examined, provided data quality and comparability are taken into account.

4.3 Applications in public health

DALYs can inform the planning, implementation, and evaluation of health actions by identifying the conditions responsible for the greatest health losses. Their application in global and regional burden of disease studies allows conditions to be compared and supports the identification of health priorities. In Brazil, territorial diversity, regional inequalities, population aging, and the coexistence of chronic and infectious diseases and external causes reinforce the importance of analyses considering the distribution of morbidity and mortality.

By providing an aggregate measure, DALYs contribute to a macro-level analysis of health problems. Nevertheless, interpretation must consider the methodological choices underlying estimates, data availability, and epidemiological and social differences between populations.

5 QALY AND DALY: DIFFERENCES AND COMPLEMENTARITY

QALYs and DALYs are composite indicators that relate health to length of life but adopt different perspectives. QALYs focus on health gains produced by interventions, assigning values to years lived according to the quality of the health state. DALYs focus on population health losses, adding years lost due to premature death to years lived with disability. In short, the former express quality-adjusted gains, while the latter express disease burden or health loss.



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DIMENSION	QALY	DALY
Central perspective	Health gains	Health losses / disease burden
Object of measurement	Quality-adjusted life-years	Years of life lost due to premature mortality and disability
Components	Length of life and health-state utility weight	YLL (premature mortality) + YLD (disability)
Valuation framework	Preferences/utilities assigned to health states	Disability weights associated with health states
Main applications	Cost–utility evaluation and comparison of interventions	Epidemiology, disease burden, and population planning
Critical issues	Preferences, interpersonal comparability, and opportunity cost	Data quality, disability weights, and comparability between populations

Source: Prepared by the authors.

The difference also concerns analytical purpose. QALYs are particularly relevant when comparing intervention alternatives according to the health gains they produce relative to costs. DALYs are especially useful when the central question is to quantify and compare the burden of different diseases in a population. The indicators thus answer different questions and can be used complementarily, provided their units, valuation frameworks, and direction of interpretation are not confused.

Complementarity matters for management: information on disease burden can help identify population needs and priorities, while QALY-based evaluations can inform comparisons among interventions intended to meet those needs. Such integration does not automatically determine a decision but broadens the evidence available to managers.

The distinction can also be understood in terms of the indicators' units and analytical questions. QALYs express quality-adjusted life-years and are used to estimate benefits obtained from an intervention relative to an alternative. DALYs express healthy life-years lost and are used to quantify the burden attributable to diseases and injuries. Consequently, one QALY gained does not automatically correspond to one DALY averted, even though both measures relate to time and health. Reference populations, weights, valuation methods, and analytical designs are not necessarily equivalent.

For QALYs, utility seeks to represent preferences regarding health states, frequently elicited through generic instruments and choice-based methods. For DALYs, disability weights represent the relative severity of nonfatal states in estimating population health loss. Although both use numerical values associated with health states, their construction processes and purposes are not identical. Directly comparing values or mechanically converting between the two metrics may produce inappropriate interpretations. Their complementarity lies in addressing different questions at different stages of decision-making.



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An integrated analysis may begin by identifying conditions accounting for the greatest disease burden, using DALYs and their components. Economic evaluations can then compare potential interventions for priority conditions, estimating costs and QALY gains where the nature of the technology and available data permit. The first stage helps clarify collective needs; the second examines the relative value of concrete alternatives. This sequence should not be rigid: health priorities also depend on severity, vulnerability, operational feasibility, and social demands, while economic evaluations may reveal preventive benefits that are not immediately visible in burden statistics.

6 CONTRIBUTIONS TO HEALTH SYSTEM MANAGEMENT AND PUBLIC HEALTH POLICY

Health system management involves choices in the face of growing needs and finite resources. Adopting a technology may benefit particular groups but also entails an opportunity cost, since the resources used are no longer available for other actions. In this context, indicators that organize information about health outcomes and losses can improve the assessment of alternatives.

QALYs provide a common unit for comparing gains from different interventions and supporting cost–utility evaluations. Their use can help assess whether additional resources allocated to a technology yield commensurate gains in length and quality of life. DALYs, in turn, identify conditions responsible for substantial health losses and support planning for prevention, care, and service organization.

In public policymaking, these indicators can help make priorities explicit, monitor outcomes, and organize evidence for funding decisions. They do not, however, replace clinical, epidemiological, economic, institutional, and social assessment. Public decisions must also consider implementation capacity, the territorial distribution of services, the needs of vulnerable groups, and effects on equity.

In Brazil's Unified Health System (Sistema Único de Saúde, SUS), regional diversity and socioeconomic inequalities make it especially important to avoid decontextualized interpretations of aggregate findings. The distribution of disease burden and the potential gains from interventions must be analyzed in relation to actual conditions of access, service availability, and the needs of different population groups.

In health technology assessment, QALYs may be used in cost–utility analyses to compare medicines, procedures, equipment, programs, and other interventions affecting survival and quality of life. Evaluations should consider clinical evidence of efficacy and safety, relevant direct costs, consequences for patients and services, and uncertainty associated with extrapolating results. Economic analysis does not replace clinical assessment or, by itself, constitute a technology adoption decision. It forms part of a body of evidence that must be considered in light of system needs, health priorities, and implementation conditions.

Within SUS, technology adoption must be examined in relation to the principles of universality, comprehensiveness, and equity, as well as financing and organizational responsibilities across levels of government. A technology offering substantial individual benefit may have a major budget impact when



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provided to a large population. Conversely, an intervention with a low unit cost may require infrastructure, personnel, and logistics that are not equally available in all areas. Cost–utility analysis must therefore be considered alongside budget impact analysis, installed capacity, care pathways, and regional distribution of services.

Discussion of efficiency cannot be limited to reducing expenditure. In healthcare, efficiency means achieving meaningful outcomes with available resources while avoiding waste, duplication, low-value procedures, and barriers that delay necessary care. An intervention may be technically effective but inefficient when its opportunity cost is high or its implementation diverts resources from actions offering greater collective benefit. Economic evaluation helps make these choices explicit but requires comprehensive accounting of costs and measurement of outcomes consistent with the intervention's purpose. It should therefore be understood as a decision-support tool rather than a substitute for analyzing system needs and objectives (De Liberal, 2020).

Opportunity cost is the health benefit forgone when scarce resources are allocated to one alternative instead of another. This dimension is particularly relevant in public systems because funding is limited and allocation decisions affect different groups and levels of care. Adopting a technology involves more than its purchase price: it entails costs of diagnosis, follow-up, infrastructure, training, adverse events, and treatment continuity. Appropriate comparisons must consider the full set of resources mobilized and actions that may be delayed or reduced as a result.

Equity adds a distributional dimension to efficiency analysis. Maximizing total QALYs may favor interventions producing larger gains per person or populations with greater potential to respond; if applied in isolation, however, this approach may disadvantage people with rare diseases, disabilities, complex conditions, or greater social vulnerability. Similarly, ranking conditions by DALYs should not become an automatic hierarchy of entitlement to care. Public management must weigh the scale of the problem, severity, potential for intervention, inequalities in access, and protection of historically underserved groups.

Distributive justice requires making explicit how benefits, risks, and costs are distributed. Two policies may produce the same aggregate health gain while having very different consequences: one may concentrate benefits among groups already enjoying better access, whereas another may reduce territorial or social inequalities. Analysis of average outcomes should therefore be complemented by disaggregation by age, sex, race/ethnicity, income, territory, and other relevant dimensions, subject to data availability and quality. This approach helps identify who actually benefits from decisions and who continues to have unmet needs.

Luiz, Oliveira, and De Liberal (2026) emphasize that health economics measures, including cost–utility, QALYs, and DALYs, support intervention evaluation and resource allocation, but comparisons depend on the economic, social, political, cultural, and institutional contexts in which they are produced. This observation reinforces the need to avoid automatically transferring findings from

other countries or systems to SUS. Differences in prices, network organization, epidemiological profiles, coverage, and financing capacity may alter both costs and expected effects.

An economic perspective must also recognize that health cannot be reduced to a commodity or an outcome of productivity. Oliveira and De Liberal (2026) stress that understanding health as a social right requires consideration of the social determinants of health and disease and the role of the state in regulation, financing, and guaranteeing universal access. Applied to QALYs and DALYs, this perspective prevents the indicators from becoming technocratic instruments detached from living conditions. They can improve decisions when integrated into a broader conception of health and public responsibilities for social protection.

7 METHODOLOGICAL LIMITATIONS AND ETHICAL CONSIDERATIONS

Using QALYs and DALYs involves methodological decisions that influence results. For QALYs, utility assignment depends on the selection of health states, measurement instruments, and consulted groups. Different methods may yield different values, and individual preference alone is not necessarily a sufficient criterion for collective decisions. Interpersonal utility comparisons involve value judgments and require transparency about the assumptions adopted.

For DALYs, estimation depends on the quality of mortality and morbidity records, the definition of reference parameters, and the weights assigned to disability states. Differences in data availability and quality can affect comparability across regions and countries. Furthermore, aggregate indicators may conceal internal inequalities when findings are not disaggregated by territory and relevant population characteristics.

A cross-cutting ethical concern is the risk of reducing the complexity of human experience to a numerical measure. Health states, functional limitations, and preferences are experienced in different social contexts shaped by income, working conditions, gender, age, race, territory, and access to services. The use of weights and averages must therefore be accompanied by critical examination of who benefits, who may remain underserved, and how priorities are justified.

Equity also requires discussion. Decisions guided exclusively by maximizing aggregate gains may fail to adequately address highly vulnerable groups or rare and complex conditions. Similarly, rankings of health losses should not be interpreted as measures of people's social worth. The indicators describe dimensions of health outcomes; they do not define the intrinsic worth of individuals or groups.

Consequently, QALYs and DALYs should be understood as decision-support tools rather than sole or automatic criteria for allocating resources. Their legitimacy depends on methodological transparency, evidence quality, public participation, and alignment with principles of universality, comprehensiveness, and equity.

For DALYs, uncertainty arises from mortality and morbidity estimates as well as the classification of causes, sequelae, and disability weights. Changes in methods, data sources, and models can alter historical series; temporal comparisons must therefore verify methodological

consistency. Moreover, aggregate national results may conceal important local differences. For decentralized SUS management, estimates at smaller territorial scales are useful but must be interpreted in light of statistical instability caused by small populations and relatively rare events.

The ethical debate shared by both indicators concerns the tension between maximizing outcomes and protecting rights. Public policy cannot consider only the total volume of gains or losses without examining who experiences them, which barriers prevent access, and whether the criteria used reproduce pre-existing inequalities. Averages may conceal important differences; weights may reflect debatable conventions; and prioritization based exclusively on efficiency may relegate low-prevalence but highly severe conditions to the background. The appropriate response is not to abandon measurement but to situate it within a pluralistic, transparent, and accountable decision-making process.

8 CONCLUDING REMARKS

The analysis developed in this study shows that QALYs and DALYs are important tools for evaluating health outcomes, although they proceed from distinct perspectives and serve specific purposes. Whereas QALYs estimate health gains by simultaneously considering quantity and quality of life, DALYs quantify disease burden through losses associated with premature mortality and disability. This distinction does not necessarily place the indicators in opposition; rather, it reveals opportunities for complementary use in understanding population health and evaluating the effects of interventions.

In management and public policy, both indicators provide important evidence for health technology assessment, comparisons of interventions, priority setting, and resource allocation. Their application nevertheless requires attention to the conceptual assumptions and methodological choices underlying calculations, since different parameters, valuation criteria, and contexts can influence findings and the decisions based on them.

Another important aspect concerns the ethical and distributional limitations of these indicators. Quantifying health gains and losses, although it can make analyses more objective, does not by itself capture the full complexity of health needs. Socioeconomic differences, vulnerability, inequalities in access to services, and the circumstances of population groups must be considered to avoid reinforcing pre-existing inequalities through decisions based solely on numerical results. Accordingly, indicator use should be accompanied by reflection on equity, vulnerability, and distributive justice.

QALYs and DALYs can therefore improve health management and public policy when used as part of a broader evidence base integrating epidemiological, economic, clinical, and social information. Their contribution is not to replace clinical, epidemiological, or political judgment, but to make particular dimensions of health gains and losses more explicit, fostering transparent, contextualized, and socially responsible decisions.

In conclusion, the potential of these indicators extends beyond measurement: they can improve the analysis of intervention outcomes and strengthen the evidence base for health system decisions. Their incorporation must therefore be associated with methodological transparency, critical



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interpretation of findings, and a commitment to universality, comprehensiveness, and equity, especially in public health systems.

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