# Multi-Criteria Decision Analysis in Health Intervention Priority Setting for Universal Health Coverage in Kenya: An exploratory study. HTA 3

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## Introduction

- Expanding service coverage is key to priority setting for Universal Health Coverage (UHC) as countries grapple with the decision on the range of health services to provide first (1,2).
- No country in the world can provide all health interventions to its citizens as public finances are finite (3,4).
- Therefore, priorities must be set, and decisions must be made on which health interventions to provide first (3). To help decision makers to set priorities for health interventions, there are several frameworks in use.
- Multi-Criteria Decision Analysis (MCDA) stands out as it has the advantage of incorporating multiple criteria simultaneously while capturing trade-offs and involving different stakeholders in the priority setting process (5,6).
- Kenya has made UHC a top priority. Therefore, there is need for systematic priority setting methods such as MCDA in Kenya.
- The study explored the use of quantitative Multi-Criteria Decision Analysis (MCDA) to set priorities for health interventions for UHC.

## Methods

- Quantitative MCDA was conducted using discrete choice modelling as the underlying method for scoring and weighting.
- Alternatives were five health interventions for the prevention of HIV/AIDs, Malaria and Tuberculosis i.e., PrEP, Voluntary medical male circumcision, Intermittent malaria prevention during pregnancy, Intermittent malaria prevention in infancy, and Tuberculosis preventive therapy (Isoniazide) (7-12).
- We measured performance of health interventions using six priority setting criteria i.e., burden of disease, congruence with existing priorities, cost of intervention, effectiveness of intervention, equity, and health systems capacity (13 - 15).
- We used data from an earlier conducted discrete choice survey with 312 participants to score alternatives and weight criteria.
- Probability of selection was used to compute the aggregate value score, and data were presented on a composite league table with unit cost estimates alongside.
- A further cost per value metric was computed and used in ranking.

## Results

- Stakeholders had a median age of 41 years (IQR 14 years), a majority had completed masters degrees, and had worked for a median of 15 years (IQR 12.75 years). Furthermore, a slight majority were female and came from diverse health related backgrounds. Most importantly, 27.24% had been involved in the development, revision, or review of a health benefit package, essential packages for health, or essential medicines list (see table 1).

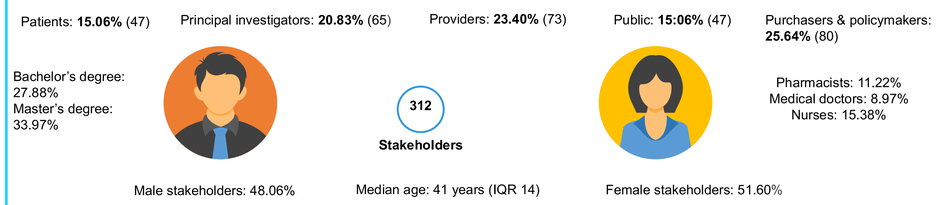


**Table 1. Characteristics of stakeholders**

| Stakeholder's current or previous involvement in priority setting initiatives | Full sample | | Public | | Patients | | Principal investigators | | Policymakers & purchasers | | Providers | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| No | 72.76% | 227 | 59.57% | 28 | 76.60% | 36 | 73.85% | 48 | 63.75% | 51 | 87.67% | 64 |
| Yes | 27.24% | 85 | 40.43% | 19 | 23.40% | 11 | 26.15% | 17 | 36.25% | 29 | 12.33% | 9 |
| | | 312 | | 47 | | 47 | | 65 | | 80 | | 73 |
| Median work experience in years | 15.00 (12.75) | 312 | 12.00 (11) | 47 | 10.50 (10) | 47 | 20.00 (10) | 65 | 18.00 (11.25) | 80 | 11 (13.75) | 73 |

- Involvement in priority setting initiatives was highest among the public (40.43%) and lowest among providers (12.33%).
- The evidence of the five interventions according to the six criteria were summarised in a performance matrix (see Table 2).

**Table 2: Performance matrix.**

| Intervention | Condition | Burden of disease | Congruence with existing priorities | Effectiveness of intervention | Equity | Health systems capacity | Cost of intervention (US $) |
|---|---|---|---|---|---|---|---|
| 1. PrEP for population at high risk of HIV (in high prevalence settings) (7, 8) | HIV/AIDs | 1759472.52 DALYs (95% CI 1557810.14, 2029168.52) (16). | High priority (17). | 49% reduction in incidence of HIV (RR 0.51 95% CI 0.28 to 0.85) (18). | HIV/AIDS showed a pro poor inequalities trend (concentration index −0.258, standard error = 0.017) among women (23). | 47.37% (26, 27). | $110.00 (28, 29). |
| 2. Voluntary medical male circumcision service in settings with high prevalence of HIV (7,9) | | | | 56% reduction in incidence of HIV (RR 0.44 95% CI 0.33 to 0.60) (19). | | 45.87% (26, 27). | $77.00 (28, 29). |
| 3. Intermittent malaria prevention during pregnancy (7, 10) | Malaria | 570872.08 DALYs (95% CI 347113.05, 879532.92) (16). | | 49% reduction in incidence of Malaria (RR 0.51 95% CI 0.38 to 0.68) (20) | Malaria showed a pro poor trend. Those from a poorer households had an adjusted malaria prevalence ratio of 1.23 (95% CI 1.08–1.41) compared to those from well-off households (24). | 74.37% (26, 27). | $1.00 (28, 29). |
| 4. Intermittent malaria prevention in infancy (7, 11) | | | | 30% reduction in incidence of Malaria (95% CI 19.8% to 39.4%) (21). | | 73.37% (26, 27). | $1.10 (28, 29). |
| 5. TB preventive therapy (Isoniazide) for high-risk people (7, 12) | Tuberculosis | 916690.31 DALYs (95% CI 561636.98, 1209041.43) (16). | | 62% reduction in incidence of Tuberculosis (RR 0.38 95% CI 0.25 to 0.57) (22). | Tuberculosis showed a pro poor trend. Those from the highest wealth quintile had 0.55 (95% CI 0.33–0.92) and 0.70 (95% CI 0.54–0.93) odds of having TB as compared to those from the lowest wealth quintile (25). | 67.37% (26, 27). | $200.00 (28, 29). |

## Results (2)

- Intermittent presumptive treatment during pregnancy was valued highly (0.981 95% CI 0.974 – 0.989) followed by PrEP (0.970, 95% CI 0.959 – 0.982), and TB preventive therapy (Isoniazide) (0.970, 95% CI 0.959 – 0.982) (see Fig 1).

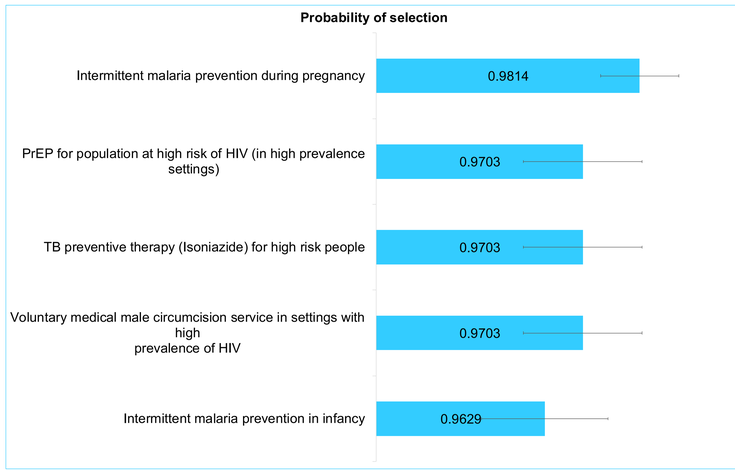


**Fig 1. Ranking of interventions by probability of selection**

- When cost of intervention was considered, Intermittent presumptive treatment during pregnancy was still ranked first with the lowest cost per value ($1.02 per value, 95% CI $1.01 - $1.03). It was followed by Intermittent malaria prevention in infancy ($1.14 per value, 95% CI $1.13 - $1.16) and Voluntary medical male circumcision ($79.35 per value, 95% CI $78.41 – $80.30) (see table 3).

**Table 3. Composite league table**

| Intervention | Probability of selection | Cost of intervention (US $) | Cost per value US $ | 95% CI |
|---|---|---|---|---|
| 1. Intermittent malaria prevention during pregnancy | 0.981 | 1.00 | $1.02 | $1.01, $1.03 |
| 2. Intermittent malaria prevention in infancy | 0.963 | 1.10 | $1.14 | $1.13, $1.16 |
| 3. Voluntary medical male circumcision service in settings with high prevalence of HIV | 0.970 | 77.00 | $79.35 | $78.41, $80.30 |
| 4. PrEP for population at high risk of HIV (in high prevalence settings) | 0.970 | 110.00 | $113.36 | $112.01, $114.71 |
| 5. TB preventive therapy (Isoniazide) for high-risk people | 0.970 | 200.00 | $206.11 | $203.66, $208.56 |

## Conclusion

- MCDA approaches have been applied in different contexts either as exploratory or institutionalised i.e., Bangladesh, Côte d'Ivoire, Ghana, Kazakhstan, South Africa, and Thailand (29 – 36).
- Strengths: Involving multiple stakeholder groups in the priority setting process, such as patients and the public, enhances legitimacy of the process as different interests are catered for (37).
- Weaknesses: Evidence gaps in operationalising criteria e.g., equity (wealth quintile distribution for diseases/conditions in Kenya).
- Lessons: MCDA in Kenya should complement methods such as cost-effectiveness analysis rather than replace them.
- Future directions: Incorporating environmental concerns into priority setting.
- Opportunity for using MCDA with decision rules which can incorporate cost-effectiveness as a criterion.

## References

References can be found on the next page.

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**References**


1. World Health Organization. The World Health Report: health systems financing: the path to universal coverage. Geneva: World Health Organization; 2010. Report No.: 9241564024.
2. Ottersen T, Norheim OF. Setting Priorities in the Pursuit of Universal Health Coverage. In: Norheim OF, Emanuel EJ, Millum J, editors. Global Health Priority-Setting: Beyond Cost-Effectiveness: Oxford University Press; 2019. p. 0.
3. Chalkidou K, Glassman A, Marten R, Vega J, Teerawattananon Y, Tritasavit N, et al. Priority-setting for achieving universal health coverage. Bulletin of the World Health Organization. 2016;94(6):462-7.
4. Glassman A, Giedion U, Sakuma Y, Smith PC. Defining a Health Benefits Package: What Are the Necessary Processes? Health Systems & Reform. 2016 Jan 2;2(1):39–50
5. Baltussen R, Niessen L. Priority setting of health interventions: the need for multi-criteria decision analysis. Cost Effectiveness and Resource Allocation. 2006 Aug 21;4(1):14.
6. BALTUSSEN, R., MARSH, K., THOKALA, P., DIABY, V., CASTRO, H., CLEEMPUT, I., GARAU, M., ISKROV, G., OLYAEEMANESH, A., MIRELMAN, A., MOBINIZADEH, M., MORTON, A., TRINGALI, M., VAN TIL, J., VALENTIM, J., WAGNER, M., YOUNGKONG, S., ZAH, V., TOLL, A., JANSEN, M., BIJLMAKERS, L., OORTWIJN, W. & BROEKHUIZEN, H. 2019. Multicriteria Decision Analysis to Support Health Technology Assessment Agencies: Benefits, Limitations, and the Way Forward. *Value in Health,* 22**,** 1283-1288.
7. FairChoices. FairChoices DCP Analytics Tool Version 3.2 2025 [Available from: https://fairchoices.uib.no/.
8. Merkesvik A, Assebe L, Ellertsen C, Coates M, Kaur G, Ahmed S, et al. PrEP for population at high risk of HIV (in high prevalence settings). Bergen, Norway: University of Bergen; 2024 25 January 2024.
9. Merkesvik A, Assebe L, Ellertsen C, Coates M, Kaur G, Ahmed S, et al. Voluntary medical male circumcision service in settings with high prevalence of HIV. Bergen, Norway: University of Bergen; 2024 8 March 2024.
10. Merkesvik A, Fekadu L, Ellertsen C, Kaur G, Ahmed S, Watkins D, et al. Intermittent malaria prevention during pregnancy. Bergen, Norway: University of Bergen; 2024 6 February 2024
11. Merkesvik A, Fekadu L, Ellertsen C, Kaur G, Ahmed S, Watkins D, et al. Intermittent malaria prevention in infancy. Bergen, Norway: University of Bergen; 2024 27 February 2024.

12. Merkesvik A, Fekadu L, Ellertsen C, Kaur G, Ahmed S, Watkins D, et al. TB preventive therapy (Isoniazide) for high risk people (e.g. PLHIV). Bergen, Norway: University of Bergen; 2024 4 April 2024.

13. Ministry of Health Kenya. Report on the UHC Essential Benefits Package. Nairobi, Kenya: Universal Health Coverage Health Benefits Package Advisory Panel; 2018.

14. Mbau R, Oliver K, Vassall A, Gilson L, Barasa E. A qualitative evaluation of priority-setting by the Health Benefits Package Advisory Panel in Kenya. Health Policy and Planning. 2023 Jan 1;38(1):49–60.

15. Tromp N, Baltussen R. Mapping of multiple criteria for priority setting of health interventions: an aid for decision makers. BMC Health Services Research. 2012 Dec 13;12(1):454.

16. Global Burden of Disease Collaborative Network. Global Burden of Disease Study 2021 (GBD 2021) Results 2022 [Available from: https://vizhub.healthdata.org/gbd-results/.

17. The World Bank Group. Sustainable Financing for Priority Programs in Kenya: A Technical Review of Priority Programs in Kenya. The World Bank Group; 2022.

18. Okwundu C, Uthman O, Okoromah C. Antiretroviral pre-exposure prophylaxis (PrEP) for preventing HIV in high-risk individuals. Cochrane Database of Systematic Reviews [Internet]. 2012;(7). Available from: https://doi.org//10.1002/14651858.CD007189.pub3

19. Mills E, Cooper C, Anema A, Guyatt G. Male circumcision for the prevention of heterosexually acquired HIV infection: a meta-analysis of randomized trials involving 11 050 men. HIV Medicine. 2008 July 1;9(6):332–5.

20. Kayentao K, Garner P, Maria van Eijk A, Naidoo I, Roper C, Mulokozi A, et al. Intermittent Preventive Therapy for Malaria During Pregnancy Using 2 vs 3 or More Doses of Sulfadoxine-Pyrimethamine and Risk of Low Birth Weight in Africa: Systematic Review and Meta-analysis. JAMA. 2013 Feb 13;309(6):594–604.

21. Aponte JJ, Schellenberg D, Egan A, Breckenridge A, Carneiro I, Critchley J, et al. Efficacy and safety of intermittent preventive treatment with sulfadoxine-pyrimethamine for malaria in African infants: a pooled analysis of six randomised, placebo-controlled trials. The Lancet. 2009 Oct 31;374(9700):1533–42.

22. Akolo C, Adetifa I, Shepperd S, Volmink J. Treatment of latent tuberculosis infection in HIV infected persons. Cochrane Database of Systematic Reviews [Internet]. 2010;(1). Available from: https://doi.org//10.1002/14651858.CD000171.pub3

23. Ekholuenetale M, Onuoha H, Ekholuenetale CE, Barrow A, Nzoputam CI. Socioeconomic Inequalities in Human Immunodeficiency Virus (HIV) Sero-Prevalence among Women in Namibia: Further Analysis of Population-Based Data. International Journal of Environmental Research and Public Health. 2021;18(17):9397.

24. Were V, Buff AM, Desai M, Kariuki S, Samuels A, ter Kuile FO, et al. Socioeconomic health inequality in malaria indicators in rural western Kenya: evidence from a household malaria survey on burden and care-seeking behaviour. Malaria Journal. 2018;17(1):166.

25. Yates TA, Ayles H, Leacy FP, Schaap A, Boccia D, Beyers N, et al. Socio-economic gradients in prevalent tuberculosis in Zambia and the Western Cape of South Africa. Tropical Medicine & International Health. 2018;23(4):375–90.

26. Ministry of Health Kenya. Kenya Harmonised Health Facility Assessment (KHFA) 2018/2019. Nairobi, Kenya: Ministry of Health: Division of Health Sector Monitoring and Evaluation; 2019.

27. Okoroafor S, C., Kwesiga B, Ogato J, Gura Z, Gondi J, Jumba N, et al. Investing in the health workforce in Kenya: trends in size, composition and distribution from a descriptive health labour market analysis. BMJ Global Health. 2022;7(Suppl 1):e009748.

28. Watkins DA, Qi J, Kawakatsu Y, Pickersgill SJ, Horton SE, Jamison DT. Resource requirements for essential universal health coverage: a modelling study based on findings from Disease Control Priorities, 3rd edition. The Lancet Global Health. 2020;8(6):e829–39.
29. Disease Control Priorities. Disease Control Priorities Cost Model. 2020.

30. Youngkong S, Baltussen R, Tantivess S, Mohara A, Teerawattananon Y. Multicriteria Decision Analysis for Including Health Interventions in the Universal Health Coverage Benefit Package in Thailand. Value in Health. 2012;15(6):961-70.

31. Haider MS, Youngkong S, Thavorncharoensap M, Thokala P. Priority setting of vaccine introduction in Bangladesh: a multicriteria decision analysis study. BMJ Open. 2022;12(2):e054219.

32. Diaby V, Lachaine J. An application of a proposed framework for formulary listing in low-income countries. Applied Health Economics and Health Policy. 2011;9(6):389-402.

33. Baltussen R, Stolk E, Chisholm D, Aikins M. Towards a multi-criteria approach for priority setting: an application to Ghana. Health Economics. 2006;15(7):689-96.

34. Miot J, Wagner M, Khoury H, Rindress D, Goetghebeur MM. Field testing of a multicriteria decision analysis (MCDA) framework for coverage of a screening test for

cervical cancer in South Africa. Cost Effectiveness and Resource Allocation. 2012;10(1):2.

35. Youngkong S, Teerawattananon Y, Tantivess S, Baltussen R. Multi-criteria decision analysis for setting priorities on HIV/AIDS interventions in Thailand. Health Research Policy and Systems. 2012;10(1):6.

36. Oortwijn W, Surgey G, Novakovic T, Baltussen R, Kosherbayeva L. The Use of Evidence-Informed Deliberative Processes for Health Benefit Package Design in Kazakhstan. International Journal of Environmental Research and Public Health. 2022;19(18):11412.

37. SteelFisher GK. Including the public perspective in health-related MCDA: ideas from the field of public opinion research and polling. Cost Effectiveness and Resource Allocation. 2018;16(1):39.

38. Slidemodel.com. 50,000+ PowerPoint Templates. 2026. Available from http://slidemodel.com/