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Research Article

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ABSTRACT

Introduction: Ebola Bundibugyo virus disease (EBVD) was imported into Kenya from the Democratic Republic of the Congo on 3 October 2026. Economic evidence is lacking to inform Kenya's Ministry of Health's advocacy for domestic and external investment to bolster prevention, mitigation, preparedness, and response to EBVD. This study aimed to estimate, from an economy-wide (societal) perspective, the discounted welfare and productivity losses associated with the death of the index case of EBVD in Kenya on 6 October 2026.

Methods: Drawing on various secondary sources, this study uses the human capital approach (HCA), the willingness-to-pay small (WTP_S) and large (WTP_L) models, and the willingness-to-accept small (WTA_S) and large (WTA_L) models to estimate discounted welfare and productivity losses associated with the death of the index case of EBVD in Kenya. To assess the robustness of the results, the five models were each re-estimated four times, assuming (i) a 5% discount rate, (ii) a 10% discount rate, (iii) Africa's highest male average life expectancy at birth, 74.55 years in Tunisia, and (iv) the world's highest male average life expectancy, 84.78 years in Monaco.

Results: Under the HCA model, the death of the 40-year-old male patient is expected to result in a total welfare loss of Int$120,944 and a productivity loss of Int$40,763. Using the implied WTP approach, the expected welfare loss would be between Int$423,302 and Int$786,133, with a productivity loss of between Int$142,669 and Int$264,957. Applying the implied WTA approach yields a welfare loss of Int$1,269,907 to Int$4,051,608 and a productivity loss of Int$428,007 to Int$1,365,546. Re-estimating the HCA, WTP_S, WTP_L, WTA_S, and WTA_L models with 5% and 10% discount rates reduced the estimated welfare and productivity losses by about 17% and 45%, respectively. Re-running the welfare and productivity loss models with Africa's and the world's highest male life expectancies increased the welfare loss estimates by about 35% and 54%, respectively.

Conclusions: The death of the index case of EBVD in Kenya will likely lead to significant welfare and productivity losses. Kenya's Ministry of Health should continue advocacy with the whole-of-government, the private sector, civil society, and development partners to urgently increase investment to bridge gaps in International Health Regulations core capacities, universal health coverage, and WASH (water, sanitation, and hygiene), thereby mitigating the risk of EBVD becoming a national epidemic.

Introduction

According to the World Health Organisation (WHO) [1], the Ebola virus comprises five distinct species: Bundibugyo, Côte d'Ivoire, Reston, Sudan, and Zaïre. Ebola Bundibugyo virus disease (EBVD) is a severe zoonotic disease characterised by high person-to-person transmission and a case fatality rate of 25%–90% [1]. The disease spreads through direct contact with the blood, secretions, organs, or other bodily fluids of infected individuals, or with contaminated surfaces and materials [1]. Early symptoms include fever, fatigue, muscle pain, headache, and sore throat, which progress to gastrointestinal symptoms, organ dysfunction, and, in some cases, haemorrhagic manifestations [2]. Since its first detection in May 2026 in the Democratic Republic of the Congo (DRC), by 4 October the ongoing EBVD outbreak had resulted in 8603 confirmed cases, including 4,148 deaths [a crude case fatality ratio (CFR) of 48.2%] [3].

The ongoing EBVD outbreak in the DRC has spread to Kenya, the fourth country affected in the current outbreak, following earlier detections in Uganda and France, where the events have since been controlled [4]. On 6 October 2026, the Ministry of Health (MOH) of Kenya reported the country's first laboratory-confirmed imported EBVD case and death [5]. The patient, a male Kenyan citizen who had lived in the DRC for seven years, travelled by road from the DRC to Kampala (Uganda) and then flew to Nairobi (Kenya) on 3 October 2026. He passed through Jomo Kenyatta International Airport for routine public health screening without being detected. Family members transported him directly to The Nairobi Hospital, where he was placed in isolation. On 5 October 2026, laboratory tests at the National Virology Reference Laboratory and the Kenya Medical Research Institute Laboratory confirmed that the sample collected from the patient was positive for EBVD. Late on the same day, the patient died while undergoing treatment [5,6].

On 12 October 2026, Kenya's Cabinet Secretary for Health, by Legal Notices Nos. 203 and 204, declared EBVD a formidable epidemic disease and established binding rules for EBVD prevention, surveillance, notification, testing, contact tracing, isolation, quarantine, treatment referral, decontamination, and safe burial [7]. The declaration and rules were issued under the powers conferred by section 35 of the Public Health Act [8].

Kenya's capacity to prevent, prepare for, and respond to notifiable diseases such as EBVD depends on the strength of the national health system. The WHO and the World Bank jointly developed the UHC Service Coverage Index (UHCSCI) to measure the strength of a national health system on a scale of 0 to 100 [9]. The UHCSCI comprises four component sub-indices: infectious diseases (IDS); non-communicable diseases (NCD); reproductive, maternal, newborn and child health (RMNCH); and service capacity and access (SCA) [9,10]. The index is the geometric mean of essential health service coverage and ranges from 0 (totally ineffective) to 100% (optimal) [9,10].

As shown in Table 1, Kenya's UHCSCI was 57 in 2023, indicating a 43% gap in essential health service coverage [11]. Although Kenya's UHCSCI score is 11.11% higher than the average for the African Region (AFR), it is lower than the scores for the Region of the Americas (AMR), Eastern Mediterranean Region (EMR), European Region (EUR), South-East Asia Region (SEAR), and Western Pacific Region (WPR) by 37.14%, 10%, 35.97%, 17.6%, and 34.78%, respectively.

Table 1: A Comparison of Kenya's and the WHO six regions' UHC Service Coverage Index

Location	UHC Service Coverage Index (SDG target indicator 3.8.1)				
	2023 Value	2022 Value	2021 Value	2020 Value	2019 Value
Kenya	57	57	53	49	52
Africa Region (AFR)	51	50	49	48	48
Region of the Americas (AMR)	83	83	83	83	82
Eastern Mediterranean Region (EMR)	63	63	63	63	62
Europe Region (EUR)	82	82	82	81	81
South-East Asia (SEAR)	68	67	66	65	64
Western Pacific Region (WPR)	81	81	80	80	79

Source: WHO [11].

As shown in Table 2, in 2023, Kenya's UHCSI gap was driven by deficits across its four component sub-indices: 63 in the UHC Service Coverage sub-index for IDS; 34 in the UHC Service Coverage sub-index for NCD; 45 in the UHC Service Coverage sub-index for SCA; and 22 in the UHC Service Coverage sub-index for RMNCH.

Table 2: Kenya's UHC service coverage index (SDG 3.8.1) and components sub-indices in 2023 to 2019

Names of UHC service coverage sub-indices	UHC service coverage sub-indices scores				
	2023 Value	2022 Value	2021 Value	2020 Value	2019 Value
UHC Service Coverage sub-index on infectious diseases (IDS)	37	41	43	34	40
UHC Service Coverage sub-index on noncommunicable diseases (NCD)	66	66	66	65	65
UHC Service Coverage sub-index on service capacity and access (SCA)	55	50	37	33	37
UHC Service Coverage sub-index on reproductive, maternal, newborn and child health (RMNCH)	78	78	77	76	75

Source: WHO [11].

In the EBVD context, IDS and SCA gaps of 45% or more raise the greatest concerns about Kenya's national health system's capacity to prevent disease (through public hygiene and points-of-entry screening), detect it early (through active surveillance, rapid testing, and contact tracing), quarantine exposed but currently healthy individuals during the disease's incubation period, isolate confirmed-positive or symptomatic individuals from healthy and quarantined people to break the chain of transmission, and manage the disease (through clinical treatment, supportive care, and monitoring in designated treatment centres until

patients recover and are no longer contagious)—and ultimately prevent it from becoming a national epidemic [12,13].

WASH (Water, Sanitation and Hygiene) coverage in households and health facilities is vital to combating the spread of virulent infections such as EBVD. In 2024, 74.4% of Kenya's population used improved drinking water sources; improved sanitation facilities (including shared) reached 68.4%; and basic handwashing facilities with water and soap reached 57.5% [14]. Population coverage gaps of 25.6% for improved drinking water sources, 31.6% for improved sanitation facilities, and 42.5% for basic handwashing facilities with water and soap may impede efforts to prevent community-wide EBVD infections and transmission [15].

In 2025, Kenya's health facility coverage was 67.2% for water supply (improved and available on premises); 67.2% for improved and usable sanitation; and 45.3% for hygiene handwashing materials in toilets (station with basin, soap and water, or alcohol-based and rub within 5 minutes of toilet use) [14]. Health facility coverage gaps of 39.8% in improved water supply, 13.9% in improved sanitation, and 54% in hygiene handwashing materials amplify the transmission of infectious diseases (including EBVD) within health facilities [16,17,18].

In past Ebola virus disease (EVD) outbreaks in the DRC [19,20] and West Africa [21,22,23,24,25], economic analyses have informed advocacy with Ministries of Finance, the Private Sector, civil society, and development partners to bolster investment in scaling up the implementation of International Health Regulations capacities to ensure effective early detection, diagnosis, contact tracing, isolation/quarantine, treatment of positive cases, and safe burials. Such evidence does not exist in Kenya, as the country had no prior cases of Ebola before the one reported on 6 October 2026.

This case study addresses the following research question: From an economy-wide (societal) perspective, what are the discounted monetary value and productivity loss associated with a single human life lost to EBVD in Kenya as at 6 October 2026? The specific objectives were as follows: (a) To estimate, from an economy-wide (societal) perspective, the discounted welfare loss associated with the death of the index case of EBVD in Kenya. (b) To estimate, from an economy-wide (societal) perspective, the discounted economic productivity losses associated with the death of the index case of EBVD in Kenya.

Methods

Study area and population

The current case report concerns the fatal index case of EBVD in Kenya, which occurred on 5 October 2026 and was reported by the Kenyan MOH the following day.

Analytical framework

Estimation of the discounted welfare loss

The study applied three alternative methods to estimate the discounted welfare loss attributable to the first-ever human life lost to EBVD in Kenya. First, the human capital approach (HCA) conceptual framework views a person's value to society as their worth as a productive asset, measured by marginal productivity per period [26]. According to Weisbrod [26], a person's present value at any age is the discounted expected future earnings stream, net of

consumption. Formally, from an HCA perspective, the welfare loss from a premature EBVD death at any age is:

$$DWL_{HCA} = \sum_{t=1}^{t=n} \left[\left(\frac{1}{(1+r)^t} \right) \times (GDPPC_{KENYA} - CHEPC_{KENYA}) \right] \dots \dots \dots (1)$$

Where: DWL_{HCA} is the discounted welfare loss of human life lost due to EBVD in the HCA model; $\sum_{t=1}^{t=n}$ is the sum over the years of life lost, from t=1 to t=n; $\left(\frac{1}{(1+r)^t} \right)$ is the discount factor; r is the discount rate of 3%, widely applied in Africa; $GDPPC_{KENYA}$ is the gross domestic product per capita in Kenya in 2026; $CHEPC_{KENYA}$ is the current health expenditure per person in Kenya in 2026; $NHGDPPC_{KENYA}$ is the non-health GDP per capita, i.e. $(GDPPC_{KENYA} - CHEPC_{KENYA})$.

We used Kenya's most recent per capita current health expenditure data from the World Bank [27] World Development Indicators database, namely Int$244 in 2021, Int$254.3 in 2022, and Int$274.5 in 2023, to project values for 2024, 2025, and 2026, following the three steps outlined below.

Step 1: Calculate the Annual Changes

Find out how much the expenditure increased each year:

a) Change from 2021 to 2022: Int$254.3 - Int$244.0 = Int$10.3
b) Change from 2022 to 2023: Int$274.5 - Int$254.3 = Int$20.2

Step 2. Determine the Average Annual Growth

Average the two changes from Step 1 to obtain a steady, representative annual growth rate:

Annual growth rate = (Int$10.3+Int$20.2)/2 = Int$15.25 per year.

Step 3. Project Future Years

Add the average growth of Int$15.25 (from Step 2) to each subsequent year, starting from the last known data point (2023 = Int$274.5):

a) 2024 Projection: Int$274.5+Int$15.25 = Int$289.75.
b) 2025 Projection: Int$289.75+Int$15.25 = Int$305.
c) 2026 Projection: Int$305+Int$15.25 = Int$320.25.

The statistical life years (SLY) lost from the single EBVD fatality are 21.96 years, calculated as Kenya's average male life expectancy at birth (61.96 years) minus the index case's age at death (40 years). In the current study, we use Kenya's non-health GDP per capita to value SLY because people derive utility (or happiness) from leisure, health, and activities of daily living (including work), but not from healthcare consumption (whose demand derives from the demand for good health) [28]. EBVD (like other diseases) depletes health stock and the ability to perform activities of daily living (including work) and to enjoy leisure [29].

Second, in the willingness-to-pay (WTP) approach, economic value is the maximum income an individual is willing to sacrifice for a small reduction in the risk of death from, for example, EBVD [30]. Robinson et al. explain that the WTP approach to estimating the value of a statistical life year (VSLY) reflects a personal trade-off between the risk of death and other consumption [31].

Since no study in Kenya has yet estimated VSLY using the WTP approach, we used GDP multipliers from a recent study by Trautmann et al. in Burkina Faso [32].

Trautmann et al. [32] administered a contingent valuation survey to 1,450 people in a rural area of northwestern Burkina Faso to elicit the annual WTP for a permanent 2% reduction in the risk of death, from 5% to 3%. The authors factorially randomised participants to pay either a small range (upper bound equivalent to US$1993) or a large range (upper bound equivalent to US$9966) as response options. Table 3, which contains indifference values, VSLYs, and the GDP per capita multiplier (in International Dollars) in Burkina Faso, was extracted from Trautmann et al. [32].

Table 3: Indifference values, VSLYs, and GDP per capita multiplier (in International Dollars) in Burkina Faso

Variable	WTP_small	WTP_large	WTA-small	WTA_large
Price (amount respondents are WTP or receive annually): Mean	351	1394	647	2491
Price (amount respondents are WTP or receive annually): Median	125	249	399	1246
VSLY: Mean	17,526	69,724	32,342	124,526
VSLY: Median	6,229	12,457	19,931	62,285
GDP multiple (ratio of VSLY median to per capita GDP)	3.5	6.5	10.5	33.5
Observations	736	714	725	732

Source: Extracted from Table 2 of Trautmann et al. [32].

Robinson et al. [31] recommend that the ratio of VSYL to GDP (or gross national income) per capita can be used to derive multipliers for extrapolating the value of human life. In the current study, we extrapolated Kenya's VSYL by multiplying Kenya's per capita non-health GDP by the Burkina Faso GDP multipliers in Table 3 above. Formally, from a WTP perspective, the discounted welfare loss of a statistical human life lost to EBVD at any age:

$$DWL_{WTP_S} = \sum_{t=1}^{t=n}\left[\left(\frac{1}{(1+r)^t}\right) \times (GDPPC_{KENYA} - CHEPC_{KENYA}) \times WTP_S_GDP_multiple\right] .. (2)$$

Where: DWL_{WTP_S} is the discounted welfare loss of a statistical human life in Kenya estimated using WTP a small amount of money for a permanent 2% reduction in the risk of death; $WTP_S_GDP_multiple$ is the ratio of the Burkina Faso VSLY median (derived from responses to WTP a small amount of money for a 2% reduction in the risk of death) to Burkina Faso GDP per capita.

$$DWL_{WTP_L} = \sum_{t=1}^{t=n}\left[\left(\frac{1}{(1+r)^t}\right) \times (GDPPC_{KENYA} - CHEPC_{KENYA}) \times WTP_{L}_GDP_multiple\right] .. (3)$$

Where: DWL_{WTP_L} is the discounted value of a statistical human life in Kenya estimated using WTP for a large amount of money for a permanent 2% reduction in the risk of death; $WTP_L_GDP_multiple$ is the ratio of the Burkina Faso VSLY median (derived from responses to WTP for a large amount of money for a 2% reduction in the risk of death) to Burkina Faso GDP per capita [32].

Third, in the willingness-to-accept (WTA) approach, economic value is the minimum income an individual is willing to accept as compensation for a small increase in the risk of death, for example, from EBVD [30]. As no study in Kenya has yet estimated VSLY using the WTA approach, we used GDP multipliers from a recent study in Burkina Faso [32].

Trautmann et al. [32] administered a contingent valuation survey to 1,457 people in a rural area of northwestern Burkina Faso to elicit the annual WTA payment for a permanent 2% increase in the risk of death, from 3% to 5%. Participants were factorially randomised to receive either a small (upper bound equivalent to US$1993) or a large (upper bound equivalent to US$9966) range of payment amounts as response options. The authors present the WTA VSLYs in the last two columns of Table 3.

In the current study, we extrapolated Kenya's WTA VSYL by multiplying the discount factor, Kenya's per capita non-health GDP, and the Burkina Faso GDP multipliers in Table 3 above. Formally, from a WTA perspective, the discounted welfare loss of a statistical human life lost to EBVD at any age is:

$$DWL_{WTA_S} = \sum_{t=1}^{t=n}\left[\left(\frac{1}{(1+r)^t}\right) \times (GDPPC_{KENYA} - CHEPC_{KENYA}) \times WTA_S_GDP_multiple\right] .. (4)$$

Where: DWL_{WTA_S} is the discounted welfare loss of a statistical human life in Kenya estimated using WTA a small amount of money for a 2% increase in the risk of death; $WTA_S_GDP_multiple$ is the ratio of the Burkina Faso VSLY median (derived from responses to WTA a small amount of money for a 2% increase in the risk of death) to Burkina Faso GDP per capita [32].

$$DWL_{WTA_L} = \sum_{t=1}^{t=n}\left[\left(\frac{1}{(1+r)^t}\right) \times (GDPPC_{KENYA} - CHEPC_{KENYA}) \times WTA_L_GDP_multiple\right] .. (5)$$

Where: DWL_{WTA_L} is the discounted welfare loss of a statistical human life in Kenya estimated using WTA a large amount of money for a 2% increase in the risk of death; $WTA_L_GDP_multiple$ is the ratio of the Burkina Faso VSLY median (derived from responses to WTA a large amount of money for a 2% reduction in the risk of death) to Burkina Faso GDP per capita [32].

Estimation of the expected productivity loss in Kenya

According to Weisbrod [33], expected future productivity is a function of (a) the value of output for employed persons at each age, (b) labour-force participation rates by age, and (c) the probabilities of surviving to each age.

In the current study, we calculated the expected future productivity loss in Kenya (PL) attributable to the first-ever human life lost to EBVD by alternately multiplying the discount factor, non-health GDP per capita $(NHGDPPC_{KENYA})$, and the adjusted labour-force participation rate $(ALFPR_{KENYA})$.

Kenya's adjusted labour force participation rate, the percentage of the working-age population that is fully utilised (actively employed without underemployment), is estimated at 33.70%. How was it calculated? To find the proportion of the working-age population that is fully utilised, we deduct the combined rate of time-related underemployment and unemployment (LU2) fraction (22%) from the active labour force participation rate (43.21%) [34]:

$$ALFPR_{KENYA} = LFPR \times (1 - LU2) = 43.21\% \times (1 - 0.22) = 43.21\% \times 0.78 = 33.70\%.$$

This indicates that while 43.21% of Kenya's working-age population participates in the labour market, only 33.70% of the total working-age population holds fully productive, full-time employment without any underutilisation constraints.

The productivity loss estimated using the HCA model (PL_{HCA}):

$$PL_{HCA} = \sum_{t=1}^{t=n} \left[\left(\frac{1}{(1+r)^t}\right) \times NHGDPPC_{KENYA} \times ALPR_{KENYA}\right] \dots\dots\dots (6).$$

Where: PL_{HCA} productivity loss in Kenya estimated using the HCA model; $NHGDPPC_{KENYA}$ is the difference between Kenya's GDP per capita and current health expenditure per capita.

The productivity loss estimated using willingness-to-pay a small amount of money for a permanent 2% reduction in the risk of death $\left(PL_{WTP_S}\right)$:

$$PL_{WTP_S} = \sum_{t=1}^{t=n} \left[\left(\frac{1}{(1+r)^t}\right) \times (NHGDPPC_{KENYA} \times WTP_S_GDP_multiple) \times ALPR_{KENYA}\right] .. (7).$$

The productivity loss estimated using willingness-to-pay a large amount of money for a permanent 2% reduction in the risk of death $\left(PL_{WTP_L}\right)$:

$$PL_{WTP_L} = \sum_{t=1}^{t=n} \left[\left(\frac{1}{(1+r)^t}\right) \times (NHGDPPC_{KENYA} \times WTP_L_GDP_multiple) \times ALPR_{KENYA}\right] .. (8).$$

The productivity loss estimated using willingness-to-accept a small amount of money for a permanent 2% increase in the risk of death $\left(PL_{WTA_S}\right)$:

$$PL_{WTA_S} = \sum_{t=1}^{t=n} \left[\left(\frac{1}{(1+r)^t}\right) \times (NHGDPPC_{KENYA} \times WTA_S_GDP_multiple) \times ALPR_{KENYA}\right] .. (9).$$

The productivity loss estimated using willingness-to-accept a large amount of money for a permanent 2% increase in the risk of death $\left(PL_{WTA_L}\right)$:

$$PL_{WTA_L} = \sum_{t=1}^{t=n}\left[\left(\frac{1}{(1+r)^t}\right) \times (NHGDPPC_{KENYA} \times WTA_L_GDP_multiple) \times ALPR_{KENYA}\right] .. (10).$$

Data and sources

Table 4 presents the data used to estimate equations 1 to 10. We used Microsoft Excel (New York) to estimate these equations.

Table 4: Data and sources

Variable	***Data value***	***Data source***
GDP per capita in 2026 in Int$ $(GDPPC_{KENYA})$	Int$	International Monetary Fund [35] World Economic Outlook database.
WTP (small) $(WTP_S_GDP_multiple)$	3.5-fold GDP per capita	Trautmann et al. [32].
WTP (large) $(WTP_L_GDP_multiple)$	6.5 -fold GDP per capita	Trautmann et al. [32].
WTA (small) $(WTA_S_GDP_multiple)$	10.5-fold GDP per capita	Trautmann et al. [32].
WTA (large) $(WTP_L_GDP_multiple)$	33.5-fold GDP per capita	Trautmann et al. [32].
Current health expenditure per capita in 2026 $(CHEPC_{KENYA})$	Int$ 320.25	Author's projection using historical data (Int$244 in 2021, Int$254.3 in 2022, Int$274.5 in 2023) from World Bank [27].
Kenya's average male life expectancy at birth (years) in 2026	61.96	Worldometers [36].
Kenya's first fatal EBVD case age at death (years)	40	Republic of Kenya [5].
Kenya's fatal EBVD index case productive years of life lost	21.69	Author's estimate, i.e. 61.96 years [36] minus 40 years [5].
Tunisia average male life expectancy at birth (years) in 2026 (Africa's highest Male life expectancy)	74.55	Worldometers [36].
Monaco average male life expectancy at birth (years) in 2026 (world's highest Male life expectancy)	84.78	Worldometers [36].
Discount rate (r)	3%, 5%, and 10%	Kirigia [37]; Kirigia and Mwabu [38]; Permsuwan, Guntawongwan, and Buddhawongsa [39].
Kenya's labour force participation rate among the population aged 15 years and above $(LFPR_{KENYA})$	43.21%	ILO [34] ILOSTAT database.

Kenya's combined rate of time-related underemployment and unemployment (LU2).	22%	ILO [34] ILOSTAT database.
Adjusted labour force participation rate ($ALFPR_{KENYA}$)	33.7038%	Author's estimate using $LFPR_{KENYA}$ and LU2 from ILO [34].

RESULTS

Welfare losses attributed to the first reported Ebola death in Kenya

Table 5 presents the expected welfare losses from the first Ebola death, estimated using three alternative methods for valuing a statistical year of life: HCA, WTP, and WTA. Under the HCA, the death of the 40-year-old male patient is expected to result in a welfare loss of Int$120,944, based on Kenya's male life expectancy of 61.96 years and a 3% discount rate. However, using the implied WTP approach, the expected welfare loss would be approximately Int$423,302 to Int$786,133. Applying the implied WTA approach yields a welfare loss of Int$1,269,907 to Int$4,051,608.

Table 5: Welfare losses attributed to the first reported Ebola death in Kenya

Model	**Welfare loss in International Dollars (Int$)**
Human capital approach [DWL_{HCA}]	120,944
Willingness-to-pay a small amount for a small reduction in risk of death (NHGPPC x 3.5) [DWL_{WTP_S}]	423,302
Willingness-to-pay a large amount for a small reduction in risk of death (NHGPPC x 6.5) [DWL_{WTP_L}]	786,133
Willingness-to-accept a small compensation for a small risk of death (NHGPPC x 10.5) [DWL_{WTA_S}]	1,269,907
Willingness-to-accept a large compensation for a small risk of death (NHGPPC x 33.5) [DWL_{WTA_L}]	4,051,608

The estimated welfare losses from the HCA, WTP-S, WTP-L, WTA-S, and WTA-L are 15, 54, 99, 161, and 512 times Kenya's 2026 GDP per capita.

Welfare loss sensitivity analysis

Sensitivity to discount rate

Table 6 presents estimated welfare losses attributable to the first reported Ebola death, assuming 5% and 10% discount rates, with national male life expectancy (ALE) held constant.

Table 6: Kenya's welfare losses attributed to the first Ebola death: assuming 5% and 10% discount rates, holding national male life expectancy constant

Models	**Welfare loss in Int$ (assuming 5% discount rate)**	**Welfare loss in Int$ (assuming 10% discount rate)**
Human capital approach [DWL_{HCA}]	99,893	66,566

Willingness-to-pay a small amount for a small reduction in risk of death (NHGPPC x 3.5) [DWL_{WTP_S}]	349,624	232,982
Willingness-to-pay a large amount for a small reduction in risk of death (NHGPPC x 6.5) [DWL_{WTP_L}]	649,302	432,681
Willingness-to-accept a small compensation for a small risk of death (NHGPPC x 10.5) [DWL_{WTA_S}]	1,048,872	698,946
Willingness-to-accept a large compensation for a small risk of death (NHGPPC x 33.5) [DWL_{WTA_L}]	3,346,402	2,229,970

Re-estimating the welfare loss models with a 5% discount rate reduced the welfare loss estimates from: (a) the HCA model by Int$21,051 to Int$99,893; (b) the WTP-S model by Int$73,678 to Int$349,624; (c) the WTP-L model by Int$136,831 to Int$649,302; (d) the WTA-S model by Int$221,035 to Int$1,048,872; (e) the WTA-L model by Int$705,206 to Int$3,346,402. Therefore, applying a 5% discount rate reduced the estimated welfare losses across all methods/models by 17.41%. The estimated welfare losses from the HCA, WTP-S, WTP-L, WTA-S, and WTA-L are 13, 44, 82, 133, and 423 times Kenya's 2026 GDP per capita, respectively.

Re-calculating the welfare loss models with a 10% discount rate reduced the welfare loss estimates from: (a) the HCA model by Int$54,377 to Int$66,566; (b) the WTP-S model by Int$190,320 to Int$232,982; (c) the WTP-L model by Int$353,452 to Int$432,681; (d) the WTA-S model by Int$570,961 to Int$698,946; (e) the WTA-L model by Int$1,821,638 to Int$2,229,970. Therefore, applying a 10% discount rate reduced the estimated welfare losses across all methods/models by 45.0%. Thus, the magnitude of estimated welfare losses also depends on the discount rate used.

Sensitivity to changes in average life expectancy at birth

Table 7 shows estimated welfare losses attributable to the first reported Ebola death, assuming Africa's and the world's highest male average life expectancies of 74.55 years in Tunisia and 84.78 years in Monaco, with the 3% discount rate held constant.

Table 7: Welfare losses attributed to the death of the first Ebola case reported, assuming Africa's and the world's highest male average life expectancies, holding the discount rate constant

Valuation Method	**Welfare loss in Int$ (assuming Africa's highest male ALE)**	**Welfare loss in Int$ (assuming world's highest male ALE)**
Human capital approach [DWL_{HCA}]	163,064	186,070
Willingness-to-pay a small amount for a small reduction in risk of death (NHGPPC x 3.5) [DWL_{WTP_S}]	570,725	651,244
Willingness-to-pay a large amount for a small reduction in risk of death (NHGPPC x 6.5) [DWL_{WTP_L}]	1,059,917	1,209,454

Willingness-to-accept a small compensation for a small risk of death (NHGPPC x 10.5) [DWL_{WTA_S}]	1,712,174	1,953,733
Willingness-to-accept a large compensation for a small risk of death (NHGPPC x 33.5) [DWL_{WTA_L}]	5,462,650	6,233,340

Re-running the welfare loss models with Africa's highest male life expectancy of 74.55 in Tunisia increased the welfare loss estimates from: (a) the HCA model by Int$42,121 to Int$163,064; (b) the WTP-S model by Int$147,422 to Int$570,725; (c) the WTP-L model by Int$273,784 to Int$1,059,917; (d) the WTA-S model by Int$442,267 to Int$1,712,174; (e) the WTA-L model by Int$1,411,042 to Int$5,462,650. The estimated welfare losses from the HCA, WTP-S, WTP-L, WTA-S, and WTA-L are 21, 72, 134, 216, and 691 times Kenya's 2026 GDP per capita, respectively. Therefore, applying Africa's highest male life expectancy increased estimated welfare losses by 34.8% across all methods/models.

Recalculating the welfare loss models using the world's highest male life expectancy of 84.78 in Monaco increased the welfare loss estimates as follows: (a) the HCA model from Int$65,1261 to Int$186,070; (b) the WTP-S model from Int$227,942 to Int$651,244; (c) the WTP-L model from Int$423,321 to Int$1,209,454; (d) the WTA-S model from Int$683,826 to Int$1,953,733; (e) the WTA-L model from Int$2,181,732 to Int$6,233,340. Therefore, applying the world's highest male life expectancy increased the estimated welfare losses across all methods/models by 53.85%. Thus, the welfare loss estimates are sensitive to the average life expectancy used. This finding is logical because one variable in the analysis is years of life lost. The estimated welfare losses from the HCA, WTP-S, WTP-L, WTA-S, and WTA-L are 24, 82, 153, 247, and 788 times Kenya's 2026 GDP per capita, respectively.

Productivity losses (indirect costs) attributed to the first reported Ebola death in Kenya

Table 8 presents the expected productivity losses from the first Ebola death, estimated using HCA, WTP, and WTA approaches. Under the HCA, the death of the 40-year-old male patient is expected to result in a productivity loss of Int$40,763, based on Kenya's male life expectancy of 61.96 years and a 3% discount rate. However, under the implied WTP approach, the expected productivity loss would be approximately between Int$142,669 and Int$264,957. Under the implied WTA approach, the productivity loss would be between Int$428,007 and Int$1,365,546.

Table 8: Expected productivity losses attributed to the first reported Ebola death in Kenya

Productivity Loss Model	**Productivity loss in International Dollars (Int$)**
Human capital approach [PL_{HCA}]	40,763
Willingness-to-pay a small amount for a small reduction in risk of death (NHGPPC x 3.5) [PL_{WTP_S}]	142,669
Willingness-to-pay a large amount for a small reduction in risk of death (NHGPPC x 6.5) [PL_{WTP_L}]	264,957
Willingness-to-accept a small compensation for a small risk of death (NHGPPC x 10.5) [PL_{WTA_S}]	428,007
Willingness-to-accept a large compensation for a small risk of death (NHGPPC x 33.5) [PL_{WTA_L}]	1,365,546

The estimated productivity losses from the HCA, WTP-S, WTP-L, WTA-S, and WTA-L are 5, 18, 34, 54, and 173 times Kenya's 2026 GDP per capita. Productivity loss depends on: (a) national GDP per capita; (b) current health expenditure per capita; (c) the valuation method (with the WTP and WTA approaches yielding expected productivity losses significantly larger than the HCA); (d) the average life expectancy used, with Africa's highest male life expectancy in Tunisia at 74.55 and the world's highest in Monaco at 84.78 years, both of which increase expected productivity losses.

Productivity loss sensitivity to discount rate

Table 9 presents productivity losses attributable to the first Ebola case, assuming discount rates of 5% and 10%.

Table 9: Productivity losses attributed to the first Ebola case in Kenya, assuming discount rates of 5% and 10%		
Valuation Method	**Productivity loss at 5% discount rate (Int$)**	**Productivity loss at 10% discount rate (Int$)**
Human capital approach [PL_{HCA}]	33,668	22,435
Willingness-to-pay a small amount for a small reduction in risk of death (NHGPPC x 3.5) [PL_{WTP_S}]	117,837	78,524
Willingness-to-pay a large amount for a small reduction in risk of death (NHGPPC x 6.5) [PL_{WTP_L}]	218,839	145,830
Willingness-to-accept a small compensation for a small risk of death (NHGPPC x 10.5) [PL_{WTA_S}]	353,510	235,571
Willingness-to-accept a large compensation for a small risk of death (NHGPPC x 33.5) [PL_{WTA_L}]	1,127,865	751,585

Re-estimating the models with a 5% discount rate reduced the estimated potential productivity loss by Int$7,095 in HCA, Int$24,832 in WTP-S, Int$46,117 in WTP-L, Int$74,497 in WTA-S, and Int$237,681 in WTA-L, a 17% reduction. Recalculating the models with a 10% discount rate reduced the estimated potential productivity loss by Int$18,327 in HCA, Int$64,145 in WTP-S, Int$119,127 in WTP-L, Int$192,436 in WTA-S, and Int$613,961 in WTA-L, a 45% reduction.

Productivity loss sensitivity to average life expectancy

Table 10 presents productivity losses attributable to the first Ebola case, assuming the highest average male life expectancies in Africa and worldwide.

Table 10: Productivity losses attributed to the first Ebola case in Kenya: assuming Africa's and the world's highest male average life expectancies		
Valuation Method	**Productivity loss assuming Africa's highest average male life expectancy (Int$)**	**Productivity loss assuming the world's highest average male life expectancy (Int$)**
Human capital approach [PL_{HCA}]	54,959	62,713

Willingness-to-pay a small amount for a small reduction in risk of death (NHGPPC x 3.5) [PL_{WTP_S}]	192,356	219,494
Willingness-to-pay a large amount for a small reduction in risk of death (NHGPPC x 6.5) [PL_{WTP_L}]	357,232	407,632
Willingness-to-accept a small compensation for a small risk of death (NHGPPC x 10.5) [PL_{WTA_S}]	577,068	658,482
Willingness-to-accept a large compensation for a small risk of death (NHGPPC x 33.5) [PL_{WTA_L}]	1,841,121	2,100,872

Re-running the models with Africa's highest male life expectancy of 74.55 years in Tunisia, instead of Kenya's 61.96 years, increased productivity loss by Int$14196 in HCA; Int$49687 in WTP-S; Int$92276 in WTP-L; Int$149061 in WTA-S; and Int$475575 in WTA-L, representing a 35% increase. Re-estimating the models with the world's highest male average life expectancy of 84.78 years in Monaco, instead of Kenya's 61.96 years, increased productivity loss by Int$21950 in HCA; Int$76825 in WTP-S; Int$142675 in WTP-L; Int$230475 in WTA-S; and Int$735326 in WTA-L, representing a 54% increase.

DISCUSSION

Key findings on welfare loss

- Under the HCA model, the death of the 40-year-old male patient is expected to result in a total welfare loss of Int$120,944.
- Using the implied WTP approach, the expected welfare loss would be approximately between Int$423,302 and Int$786,133.
- Applying the implied WTA approach yields a welfare loss ranging from Int$1,269,907 to Int$4,051,608.
- Re-estimating the models with 5% and 10% discount rates reduced the estimated welfare losses by 17.41% and 45.0%, respectively.
- Re-running the models with Africa's and the world's highest male life expectancies increased the welfare loss estimates by 34.8% and 53.85%, respectively.

Key findings on productivity loss

- Under the HCA model, the death of the 40-year-old male patient is expected to result in productivity losses of Int$40,763.
- Using the implied WTP approach, the expected productivity loss would be approximately between Int$142,669 and Int$264,957.
- Applying the implied WTA approach yields productivity losses ranging from Int$428,007 to Int$1,365,546.

- Re-estimating the HCA, WTP-S, WTP-L, WTA-S, and WTA-L models using 5% and 10% discount rates reduced the estimated potential productivity loss by 17% and 45%, respectively.
- Re-running the models with Africa's highest male life expectancy of 74.55 years in Tunisia and the world's highest male average life expectancy of 84.78 years in Monaco increased productivity loss by 35% and 54%, respectively.

The magnitude of welfare and productivity losses from EBVD-attributed deaths depends on: (a) the size of national GDP per capita [32]; (b) the size of current health expenditure per capita; (c) the approach used to monetise human life (with the WTP and WTA approaches yielding significantly larger welfare losses than the HCA) [32]; (d) the higher the discount rates used, the greater the reductions in the magnitude of welfare losses estimated; (e) the use of Africa's and the world's highest male life expectancies, which significantly increases welfare losses.

Comparison with other relevant studies

Comparison with studies using HCA to estimate the average present value of a life lost to Ebola

Muthuri [19] used a human capital approach to estimate the total present value of the 754 human lives lost to EBVD in the DRC as of 13 July 2026 at Int$18,438,961, with a mean of Int$24,455 per human life. Using the HCA method, the current study estimated the present value of a human life lost to EBVD at Int$120,944, which is 79.78% higher than the 2026 DRC estimate.

In the same study, Muthuri [19] estimated total productivity loss from 646 human lives lost among those aged 15 years and older due to EBVD in the DRC at Int$9,854,268, with an average productivity loss of Int$15,257 per life lost. The current study estimates productivity loss per EBVD death in Kenya at Int$40,763, which is 67.57% higher than the DRC estimate for 2026.

Kirigia et al. [20], using a human capital approach, estimated the total present value of 1286 deaths in the DRC associated with the 2018/19 outbreak at Int$17,761,539, with an average monetary value per EVD death of Int$13,801. Using the HCA method, the current study estimated the present value of a human life lost to EBVD at Int$120,944, which is 88.59% higher than the DRC estimate for 2018/2019.

Kirigia et al. [24] estimated, in 2015 using a human capital approach, the total present value of the 11,234 human lives lost to Ebola in Guinea, Liberia, Mali, Nigeria and Sierra Leone at Int$155,663,244, and the average present value per human life lost in Guinea at Int$17,473; Liberia at Int$11,283; Mali at Int$25,126; Nigeria at Int$47,364; and Sierra Leone at Int$14,633. Using the HCA method, the current study estimated the present value of a human life lost to EBVD at Int$120,944, which is 85.55%, 90.67%, 79.22%, 60.84%, and 87.90% higher than in Guinea, Liberia, Mali, Nigeria, and Sierra Leone.

Using a Monte Carlo simulation model, Bartsch et al. [25] estimated the total societal costs of all reported EVD cases in Guinea, Liberia, and Sierra Leone to range from $82 million to over $356 million. The model estimated the total societal cost of an EVD case with full recovery at $480 to $912, whereas that of an EVD case not surviving ranged from $5929 to $18 929. To facilitate comparison with the current study in Kenya, we converted Bartsch et al.'s [25] per-case social cost estimates from U.S. Dollars (USD) into International Dollars (Int$), using the Price Level Ratio (PLR) for each of the three countries [40]. We calculated the 2014 International (PPP) Dollars in Table 11 from nominal US dollars by dividing Bartsch et al.'s per-case societal

costs expressed in nominal USD by the PLR for each country. Kenya's productivity loss from the premature deaths of the EBVD index case of Int$ 40,763 was more than twice Bartsch et al.'s lower-bound estimates across the three countries. However, Kenya's productivity loss was smaller than Bartsch et al.'s upper-bound estimates for Guinea and Sierra Leone by 12.8% and 13.7%, respectively, and higher than Sierra Leone's by 7.0%.

Table11: Bartsch et al.'s nominal USD societal cost per case of Ebola Virus Disease converted to 2024 International Dollars (Int$)

Country name	**Price Level Ratio (PLR) in 2014 [40]**	**Full Recovery Societal Costs Per Case**	
		Lower Bound	**Upper Bound**
Guinea, Liberia, and Sierra Leone from Bartsch et al. [25] (USD)		US$480	US$912
Guinea (Int$)*	0.4085	1,175	2,233
Liberia (Int$)*	0.4981	964	1,831
Sierra Leone (Int$)*	0.4047	1,186	2,254
Country name	Price Level Ratio (PLR) in 2014 [40]	Non-Survival Societal Costs Per Case	
Guinea, Liberia, and Sierra Leone from Bartsch et al. [25] (USD)		5,929	18,929
Guinea (Int$)*	0.4085	14,514	46,338
Liberia (Int$)*	0.4981	11,903	38,002
Sierra Leone (Int$)*	0.4047	14,650	46,773

Sources: Bartsch et al. [25]; World Bank [40]; *Authors' conversion estimates.

Comparison with studies using WTP to estimate the average welfare loss per Ebola death

Using the individual median WTP to avoid EVD-related mortality during the 2014/15 outbreak in Liberia, Da Costa estimated the total welfare loss at US$132 million (4.2% of Liberia's GDP in 2014), with a range of US$91 million to US$186 million [22]. To facilitate comparison, we divide the total welfare loss of US$132 million by the 4,808 EVD deaths in Liberia's epidemic, which started in March 2014 and ended on 3 September 2015 (when WHO again declared the country free of Ebola) [41], yielding an average welfare loss of US$27,454 per death [41]. Dividing Liberia's average welfare loss of US$27,454 per EVD death by the country's PLR of 0.4981 in 2014 yields Int$55,117 per death, which is 2.6- to 4.8-fold lower than Kenya's welfare loss (from the WTP approach) of between Int$142,669 and Int$264,957.

Implications for policy

The findings reported in this paper are intended solely for use in evidence-based advocacy with: (a) Kenya's population to raise awareness among the public and civil society organisations of the welfare and economic impact of EBVD; (b) government to stimulate whole-of-government investment in implementing the WHO IHR core capacities, which are fundamental to strengthening prevention, preparedness, and response to public health emergencies, including EBVD; (c) the private sector to increase investment in the safety, health, and welfare of workers and all persons lawfully present at workplaces (including during public health emergencies)

[42]; (d) development partners to support the government in supplementing domestic efforts to strengthen preparedness and response to public health emergencies, including EBVD.

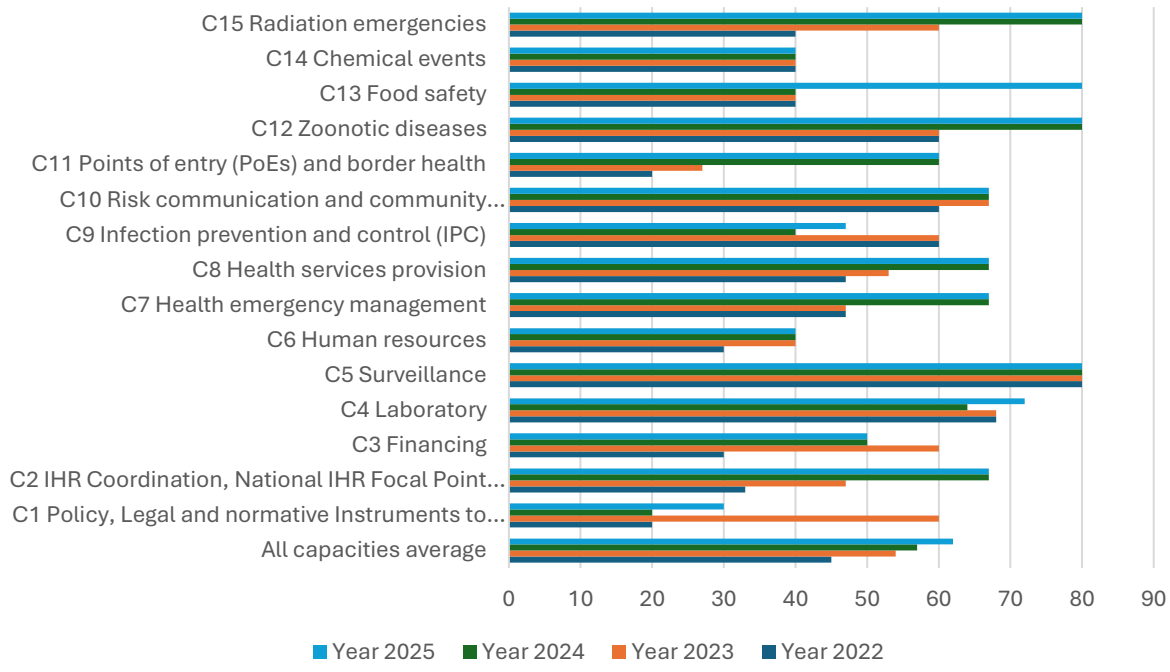
The IHR 2005 [43], adopted by the Fifty-eighth World Health Assembly (WHA) on 23 May 2005 [44], provides the international legal framework for preventing, protecting against, controlling, and responding to the international spread of diseases. The IHR obligates State Parties to build and maintain the capacity to detect, assess, notify (i.e., a time-sensitive legal requirement to trigger an alert about a major public health threat) and report (i.e., a broader, routine flow of data and surveillance information) to WHO the occurrence of diseases such as Ebola.

The WHA decided in decision WHA61(2) of 2008 [45] and later confirmed this in decision WHA71(15) of 2018 [46], in accordance with paragraph 1 of Article 54 of the IHR (2005), that "States Parties and the [WHO] Director-General shall continue to report annually to the Health Assembly on the implementation of the International Health Regulations (2005), using the self-assessment annual reporting tool."

National authorities across government sectors use the State Party Self-Assessment Annual Reporting (SPAR) Tool, which focuses on national IHR capacities for detecting and responding to potential public health emergencies [47,48]. The SPAR Tool comprises 35 indicators covering the 15 IHR capacities required to detect, assess, notify, report and respond to public health risks and acute events of domestic and international concern [47,48].

Figure 1 presents Kenya's progress in implementing the IHR 15 core capacities from 2022 to 2025 [49]. Kenya's average IHR core capacities rose from 45% in 2022 to 62% in 2025. Despite this improvement, a 38% gap across all capacities remained in 2025.

Figure 1: Kenya International Health Regulations Capacity Progress: 2022 - 2025



Source: Author-generated using data from WHO [49].

Supplementary Table 1 shows that in 2025, Kenya's average score across all IHR capacities was 62%, higher than the WHO African Region average of 50% but slightly below the global average of 63%.

According to the latest (2025) annual reporting data, the top five strengths among the 15 IHR core capacities are laboratory (72%); surveillance (80%); zoonotic diseases (80%); food safety (80%); and radiation emergencies (80%) [49]. The top five challenges are policy, legal and normative instruments for implementing the IHR (30%); financing (50%); human resources (40%); infection prevention and control (IPC) (47%); and chemical events (40%).

The Kenyan Ministry of Health should use the economic evidence presented in this paper to strengthen its advocacy and urgently mobilise adequate resources from public, private, and external sources. These resources should be allocated equitably to close gaps across the IHR core capacities, with priority given to the five challenges identified above. Timely, coordinated action is essential to prevent the current EBVD from escalating into a national epidemic. Global solidarity is equally vital to prevent a wider pandemic: because virulent infectious diseases cross borders, a collective response is indispensable.

Limitations of the study

- Our study omitted the direct costs borne by the government for coordination; risk communication and community engagement (RCCE); confirmatory laboratory testing of specimens at the National Virology Reference Laboratory and the Kenya Medical Research Institute Laboratory [50]; clinical management of suspected and confirmed EBVD cases (including testing and isolating suspected and confirmed cases); surveillance and contact tracing; Points-of-Entry control activities; Infection Prevention and Control; WASH (water, sanitation and hygiene); safe and dignified burials; and psychosocial support [51].

- Our HCA model estimates are subject to the limitations of using per capita GDP, as discussed exhaustively by Stiglitz et al. [52]. For example, GDP per capita measures market production rather than economic well-being (net national disposable income is a better indicator); it is not a measure of citizens' multidimensional quality of life; market prices may deviate from society's underlying valuation; environmental damage (e.g., air pollution) from production and consumption is not reflected in market prices; quality improvements in goods and services are insufficiently accounted for, leading to overestimation; it disregards the distribution of income, consumption and wealth; it does not incorporate some important productive activities (e.g., household management, family care, and administrative services by homemakers) that take place outside the market realm; and it does not capture non-marketed leisure activities [52].

CONCLUSION

This study has revealed that the death of the index case of EBVD in Kenya could lead to significant welfare and productivity losses. The economic evidence reported in this paper can raise public awareness of the potential impact of EBVD and inform advocacy by Kenya's Ministry of Health with the whole-of-government, private sector, civil society, and development partners

to urgently bolster investment to bridge gaps in IHR core capacities, the national health system (UHC), and WASH, thereby mitigating the risk of EBVD becoming a national epidemic.

National, continental, and global solidarity is needed to bridge gaps in IHR, national health systems (UHC), and WASH in countries reporting EBVD cases and in neighbouring countries, because EBVD potentially threatens continental and global health security [53] and economic production, and, more importantly, because EBVD violates Articles 3 (right to life), 13 (right to freedom of movement), 24 (right to rest and leisure), and 25 (right to a standard of living adequate for health and well-being) of the United Nations International Bill of Human Rights [54].

There is an urgent need for cost-benefit analyses (CBA) of alternative preventive measures (including vaccines, infection prevention and control, and safe water, sanitation, and hygiene in households, health institutions, public spaces, schools, and workplaces), diagnostics, contact tracing, quarantine, isolation, and treatments to inform decision-making and policy development. Contextualised estimates of the monetary value of statistical life, derived using the theoretically preferred WTP approach, would be an important input to CBA.

LIST OF ABBREVIATIONS AND ACRONYMS

AFR: African Region

$ALFPR_{KENYA}$: Adjusted labour-force participation rate in Kenya

AMR: Region of the Americas

ALE: Average life expectancy at birth (years)

CFR: Crude case fatality ratio

$CHEPC_{KENYA}$: Current health expenditure per person in Kenya

DRC: Democratic Republic of the Congo

DWL_{HCA}: Discounted welfare loss of human life lost due to EBVD in the HCA model

DWL_{WTA_S}: Discounted welfare loss of a statistical human life in Kenya estimated using WTA a small amount of money for a 2% increase in the risk of death

DWL_{WTA_L}: Discounted welfare loss of a statistical human life in Kenya estimated using WTA a large amount of money for a 2% increase in the risk of death

DWL_{WTP_S}: Discounted welfare loss of a statistical human life in Kenya estimated using WTP a small amount of money for a permanent 2% reduction in the risk of death

DWL_{WTP_L}: Discounted value of a statistical human life in Kenya estimated using WTP for a large amount of money for a permanent 2% reduction in the risk of death

EBVD: Ebola Bundibugyo virus disease

EMR: Eastern Mediterranean Region

EUR: European Region

EVD: Ebola virus disease

GDP: Gross domestic product

$GDPPC_{KENYA}$: Gross domestic product per capita in Kenya

HCA: Human capital approach

IDS: Infectious diseases

ILO: International Labour Organisation

IMF: International Monetary Fund

Int$: International Dollars or Purchasing Power Parity (PPP)

$LFPR_{KENYA}$: Labour force participation rate among the population aged 15 years and above

MOH: Ministry of Health of Kenya

NCD: Non-communicable diseases

$NHGDPPC_{KENYA}$: Non-health GDP per capita in Kenya

PL_{HCA}: Productivity loss estimated using the HCA model

PL_{WTA_S}: Productivity loss estimated using willingness-to-accept a small amount of money for a permanent 2% increase in the risk of death

PL_{WTA_L}: Productivity loss estimated using willingness-to-accept a large amount of money for a permanent 2% increase in the risk of death

PL_{WTP_S}: Productivity loss estimated using willingness-to-pay a small amount of money for a permanent 2% reduction in the risk of death

PL_{WTP_L}: Productivity loss estimated using willingness-to-pay a large amount of money for a permanent 2% reduction in the risk of death

r: Discount rate

RMNCH: Reproductive, maternal, newborn and child health

SCA: Service capacity and access

SEAR: South-East Asia Region

SLY: Statistical life years

UHCSCI: UHC Service Coverage Index

VSLY: Value of a statistical life year

WASH: Water, sanitation, and hygiene

WHO: World Health Organisation

WPR: Western Pacific Region

WTA: Willingness-to-accept

WTA_S: Willingness-to-Accept a small amount of money for a permanent small increase in risk of death

$WTA_S_GDP_multiple$: Ratio of the Burkina Faso VSLY median (derived from responses to WTA a small amount of money for a 2% increase in the risk of death) to Burkina Faso GDP per capita

WTA_L: Willingness-to-accept a large amount of money for a permanent small increase in risk of death

$WTA_L_GDP_multiple$: Ratio of the Burkina Faso VSLY median (derived from responses to WTA a large amount of money for a 2% reduction in the risk of death) to Burkina Faso GDP per capita

WTP: Willingness-to-pay

WTP_S: Willingness-to-pay a small amount of money for a permanent small reduction in risk of death

$WTP_S_GDP_multiple$: Ratio of the Burkina Faso VSLY median (derived from responses to WTP a small amount of money for a 2% reduction in the risk of death) to Burkina Faso GDP per capita

WTP_L: Willingness-to-pay a large amount of money for a permanent small reduction in risk of death

$WTP_L_GDP_multiple$: Ratio of the Burkina Faso VSLY median (derived from responses to WTP for a large amount of money for a 2% reduction in the risk of death) to Burkina Faso GDP per capita

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DECLARATIONS

Ethics declarations

Ethics approval and consent to participate: Not applicable. Ethical approval was not required because our study relied entirely on the analysis of existing, aggregated, secondary data (recorded in a manner that subjects cannot be identified) from international, freely available sources (Republic of Kenya Ministry of Health, International Labour Organisation, International Monetary Fund, Worldometers, World Bank).

Consent for publication: Not applicable.

Competing interests: The author declare no competing interests.

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(a). Republic of Kenya Ministry of Health press release on confirmed case of Bundibugyo Ebola Virus website: https://www.health.go.ke/kenya-confirms-first-imported-case-bundibugyo-ebola-virus-disease [5].

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Supplementary Table 1: Comparison of Kenya, global, and the WHO African Region IHR core capacities progress 2022-2025												
	Year 2022			Year 2023			Year 2024			Year 2025		
	Kenya's Average	Global Average	WHO African Region Average	Kenya's Average	Global Average	WHO African Region Average	Kenya's Average	Global Average	WHO African Region Average	Kenya's Average	Global Average	WHO African Region Average
All capacities average	**45**	**66**	**52**	**54**	**64**	**50**	**57**	**64**	**50**	**62**	**63**	**50**
C1: Policy, Legal and normative Instruments to implement IHR	20	56	38	60	54	39	20	55	38	30	56	41
C2: IHR Coordination, National IHR Focal Point functions and advocacy	33	67	51	47	65	52	67	67	54	67	66	56
C3: Financing	30	64	49	60	63	51	50	62	50	50	62	50
C4: Laboratory	68	74	61	68	70	57	64	70	57	72	69	59
C5: Surveillance	80	83	75	80	79	70	80	80	73	80	79	72
C6: Human resources	30	60	46	40	60	46	40	59	42	40	57	41
C7: Health emergency management	47	72	59	47	70	57	67	71	60	67	70	60
C8: Health services provision	47	74	63	53	72	61	67	71	56	67	70	55
C9: Infection prevention and control (IPC)	60	62	46	60	60	44	40	59	42	47	59	45
C10: Risk communication and community engagement (RCCE)	60	69	64	67	66	58	67	66	58	67	65	59
C11: Points of entry (PoEs) and border health	20	63	46	27	63	48	60	64	50	60	62	46
C12: Zoonotic diseases	60	67	58	60	64	56	80	65	55	80	65	52
C13: Food safety	40	64	47	40	62	44	40	62	43	80	62	46
C14: Chemical events	40	57	34	40	54	32	40	53	35	40	53	35
C15: Radiation emergencies	40	59	40	60	57	38	80	57	38	80	56	39