

Republic of



KENYA METEOROLOGICAL
DEPARTMENT

Republic of Kenya



MINISTRY OF HEALTH



MALARIA EPIDEMIC EARLY WARNING PREDICTION SYSTEM FOR WESTERN KENYA HIGHLAND FOR DECEMBER 2022

Ref No: KMD/MM/1-2022

Issue Date: 05/12/2022

1. Summary

The model outputs for the malaria epidemic early prediction system for the western highlands of Kenya indicate **high** risk in Kakamega and low risk of malaria outbreak in Kisii and Nandi areas in the months of December, 2022 and January, 2023.

The weather observations indicate generally a decrease in maximum temperature in all the three areas.

2. Model Outputs

2.1 Malaria epidemic early prediction system for Kakamega

Table 1 below shows the malaria epidemic early prediction system for Kakamega for December 2022.

Table 1: MALARIA EPIDEMIC EARLY PREDICTION SYSTEM: KAKAMEGA

Yr.	Month	Tmax	Mean Tmax	Tmax Deviation /anomaly	R/fall (mm)	R/fall Code	Tmax Deviation /anomaly Code	Additive % Risk
2021	12	29.5	27.5	2.0	54.4	0	4	18.2
2022	01	29.2	28.3	0.9	70.6	0	1	18.2
2022	02	28.6	29.2	-0.6	103.5	0	0	4.5
2022	03	30.4	29.1	1.3	62.8	0	4	0.0
2022	04	28.7	27.3	1.4	282.7	6	4	45.5
2022	05	27.8	26.4	1.4	138.4	0	4	18.2
2022	06	27.4	25.8	1.6	254.7	5	4	40.9
2022	07	27.2	25.6	1.6	96.8	0	4	18.2

2022	08	26.8	26.1	0.7	119.1	0	1	18.2
2022	09	27.3	26.9	0.4	189	2	1	13.6
2022	10	28.2	27.0	1.0	172.0	1	4	9.1
2022	11	27.8	26.9	0.9	178.2	2	1	27.3

The observed climate data for November 2022 indicates a decrease in maximum temperature from 28.2°C in October 2022 to 27.8°C in November 2022. However, the maximum temperature anomaly in November 2022 was positive (1.0 above the mean of the month). Rainfall increased from 172.0mm in October 2022 to 178.2mm in November 2022. The additive model percentage risk in November 2022 was 27.3%.

Box 1:
For Kakamega, the epidemic threshold level is 30%.

Consequently, there is high risk of the Malaria Epidemic outbreak in Kakamega in the month of December, 2022 and January, 2023. (See Figure 1)

Table 2 below shows the malaria epidemic early prediction system for Kisii for December 2022.

Table 2: MALARIA EPIDEMIC EARLY PREDICTION SYSTEM: KISII

Yr	Mon	Tmax (°C)	Mean Tmax (°C)	Tmin (°C)	Mean Tmin (°C)	Tmax Dev./anom	Tmin Dev./anom	Total Temp Dev./Anom	Temp Dev./anom Code	R/fall (mm)	R/fall Code	Model Output
2021	12	25.9	25.4	16.1	15.4	0.5	0.7	1.2	2	65.4	0	0
2022	01	26.4	26.1	15.9	15.7	0.3	0.2	0.5	0	96.4	0	0
2022	02	26.5	27.0	15.9	16.1	-0.5	-0.2	-0.7	0	159.3	0	0
2022	03	27.2	27.0	15.6	15.9	0.2	-0.3	-0.1	0	101.6	0	0
2022	04	26.4	25.5	16.0	15.8	0.9	0.2	1.1	2	291.5	2	0
2022	05	25.6	25.1	15.8	15.6	0.5	0.2	0.7	0	187.4	0	0
2022	06	25.2	24.6	14.8	15.0	0.6	-0.2	0.5	0	113.1	0	0
2022	07	25.9	24.5	14.7	14.5	1.4	0.2	1.6	2	98.9	0	0
2022	08	24.7	24.9	15.1	14.7	-0.2	0.4	0.2	0	138.7	0	0
2022	09	25.4	26.0	15.3	15.1	-0.6	0.2	-0.5	0	178.0	0	0
2022	10	26.7	25.8	15.8	15.2	0.9	0.6	1.5	2	209.1	1	0
2022	11	24.9	25.1	15.8	15.2	-0.2	0.6	0.4	0	150.6	0	0

The observed climate data for Kisii for November 2022 indicates a decrease in maximum temperature from 26.7°C in October 2022 to 24.9°C in November 2022. This observation in November 2022 was negative (0.2°C below the mean of the month). Rainfall decreased from 209.1mm in October 2022 to 150.6mm in November 2022. The Model output risk is Nil.

Box 2:

For Kisii, the epidemic threshold level is 20%.

Hence there is no risk of malaria epidemic in Kisii in the month of December, 2022 and January, 2023. (See Figure 2).

2.2 Malaria epidemic early prediction system for Nandi

Table 3 below shows the malaria epidemic early prediction system for Nandi for December, 2022.

Table 3: NANDI MALARIA EPIDEMIC EARLY PREDICTION SYSTEM

Yr	Mon	Tmax (°C)	Mean Tmax (°C)	Tmax Dev.	Tmin	Mean Tmin	Tmin Dev./anom	Total Temp Dev./Anom.	R/fall (mm)	Temp Dev. Filters	R/fall Filter s	Multiplicative Model
2021	12	25.3	23.7	1.6	11.4	10.8	0.6	2.2	57.6	3	0	0.0
2022	01	25.4	23.3	2.1	11.1	10.9	0.2	2.3	68.6	3	0	0.0
2022	02	25.5	23.2	2.3	11.8	11.7	0.1	2.4	75.6	3	0	0.0
2022	03	27.3	23.0	4.3	12.2	11.5	0.7	5.0	58	5	0	0.0
2022	04	27.5	22.8	4.7	11.8	11.2	0.6	5.3	256.6	5	2	30
2022	05	24.7	22.7	2.0	12.6	10.7	1.9	3.9	200.9	4	1	25
2022	06	23.5	22.7	0.8	10.5	10.9	-0.4	0.4	101.8	1	0	0.0
2022	07	23.4	22.8	0.6	11.5	10.6	0.9	1.5	61.5	2	0	0.0
2022	08	22.6	23.1	-0.5	11.4	10.8	0.6	0.2	310.1	1	3	15.0
2022	09	23.7	23.3	0.4	10.8	11.1	-0.3	0.1	207.3	1	1	10.0
2022	10	25.2	23.3	1.9	10.6	10.7	-0.1	1.7	207.3	2	1	5.0
2022	11	24.4	23.3	1.1	11.8	10.8	1.0	2.0	213.5	3	1	5.0

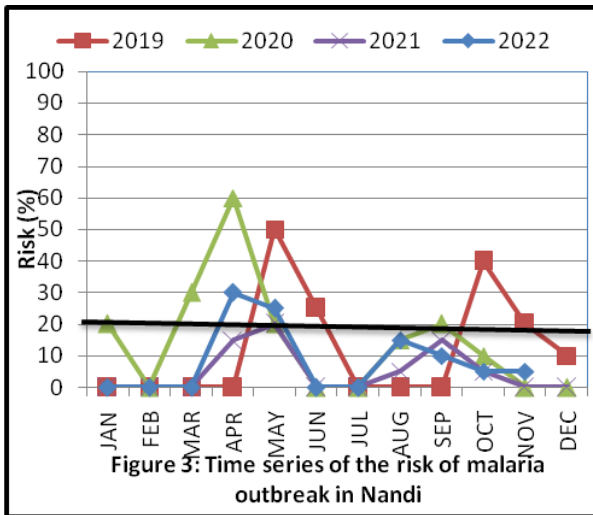
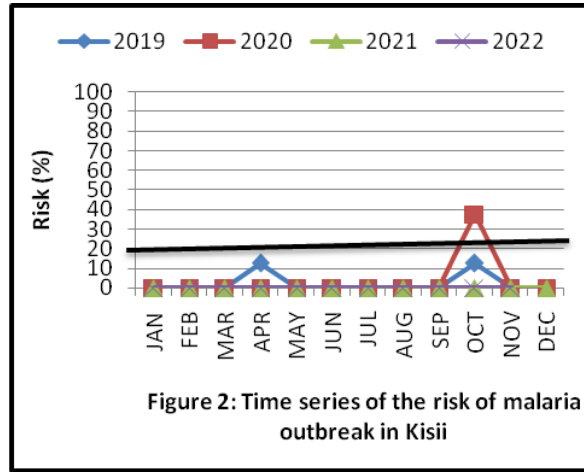
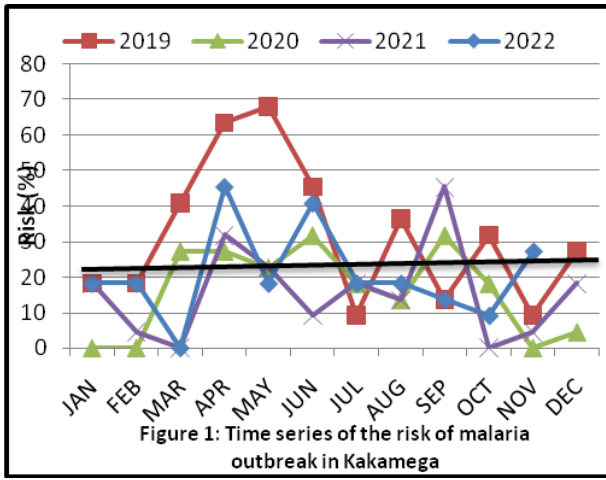
The maximum temperature in Nandi decreased from 25.2°C in October 2022 to 24.4°C in November 2022. This observation in November 2022 for Nandi was positive (1.1°C above the mean of the month).

Rainfall increased from 207.3mm in October 2022 to 213.5mm in November, 2022. The November 2022 multiplicative model percentage risk for malaria was 5.0%.

Hence, there is low risk of malaria epidemic in Nandi in the month of December, 2022 and January 2023. (See Figure 3)

Box 3:

For Nandi, epidemic threshold level is 20%.



Dr Gikungu
 DIRECTOR, KENYA METEOROLOGICAL DEPARTMENT