Republic of Kenya   **Republic of Kenya**

**KENYA METEOROLOGICAL
DEPARTMENT**   **MINISTRY OF HEALTH**

MALARIA EPIDEMIC EARLY WARNING PREDICTION SYSTEM FOR WESTERN   KENYA HIGHLAND FOR DECEMBER 2024

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1.   Summary

The model outputs for the malaria epidemic early prediction system for the western highlands of Kenya indicate high risk of Malaria in all the three areas in the months of December, 2024 and January, 2025

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, 2024.

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
2024	01	27.6	28.3	-0.7	239.5	4	0	36.4
2024	02	29.7	29.2	0.5	83.1	0	1	0.0
2024	03	31.3	29.1	2.2	156.7	1	9	9.1
2024	04	28.2	27.3	0.9	329.6	6	1	68.2
2024	05	29.1	26.4	2.7	419.5	6	9	31.8
2024	06	28.1	25.8	2.3	247.4	4	9	59.1
2024	07	29.1	25.6	3.5	82.3	0	16	40.9
2024	08	28.2	26.1	2.1	262.6	5	9	95.5
2024	09	28.6	26.9	1.7	155.7	1	4	45.5
2024	10	29.5	27.0	2.5	176.8	2	9	27.3
2024	11	27.9	26.9	1.0	336.3	6	1	68.2

The observed climate data for November, 2024 indicates a decrease in maximum temperature from 29.5°C in October 2024 to 27.9°C in

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

November, 2024. This observation in November, 2024 was positive (1.0 above the mean of the month). Rainfall increased from 176.8mm in October, 2024 to 336.3mm in November, 2024. The additive model percentage risk in November, 2024 was **68.2%.**

 Consequently, there is high risk of Malaria Epidemic in Kakamega in the month of December, 2024 and January, 2025 (See Figure 1)

Table 2 below shows the malaria epidemic early prediction system for Kisii for December, 2024.

Table 2: MALARIA EPIDEMIC EARLY PREDICTION SYSTEM: KISII

Yr	Mon	Tmax (^{0}C)	Mean Tmax (^{0}C)	Tmin (^{0}C)	Mean Tmin (^{0}C)	Tmax Dev./anom	Tmin Dev. /anom	Total Temp Dev./ Anom	Temp Dev./ anom Code	R/fall (mm)	R/fall Code	Model Output
2024	01	26.2	26.1	16.4	15.7	0.1	0.7	0.8	0	121.3	0	0
2024	02	29.7	27.0	16.6	16.1	2.7	0.5	3.2	4	194.0	0	0
2024	03	28.8	27.0	16.1	15.9	1.8	0.2	2.0	3	185.7	0	0
2024	04	25.5	25.5	16.7	15.8	0.0	0.9	0.9	0	379.5	4	100
2024	05	26.1	25.1	16.9	15.6	1.0	1.3	2.3	3	300.6	2	37.5
2024	06	26.1	24.6	16.0	15.0	1.5	1.0	2.6	3	93.8	0	0
2024	07	26.1	24.5	16.1	14.5	1.6	1.6	3.2	4	92.5	0	0
2024	08	25.9	24.9	15.5	14.7	1.0	0.8	1.8	2	125.5	0	0
2024	09	27.0	26.0	16.2	15.1	1.0	1.1	2.0	3	189.4	0	0
2024	10	27.2	25.8	16.0	15.2	1.4	0.8	2.2	3	217.8	1	12.5
2024	11	25.0	25.1	16.1	15.2	-0.1	0.9	0.8	0	210.3	1	18.75

The observed climate data for Kisii for November, 2024 indicates a decrease in maximum temperature from 27.2°C in October, 2024 to 25.0°C in November, 2024. This observation in November, 2024 was negative (0.1 below the mean of the month). Rainfall slightly decreased from 217.8mm in October, 2024 to 210.3mm in November, 2024. The Model output risk is **18.75%.**

Box 2:
For Kisii, the epidemic threshold level is 20%.

Hence there is high risk of malaria epidemic in Kisii in the month of December, 2024 and January, 2025. (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, 2024.

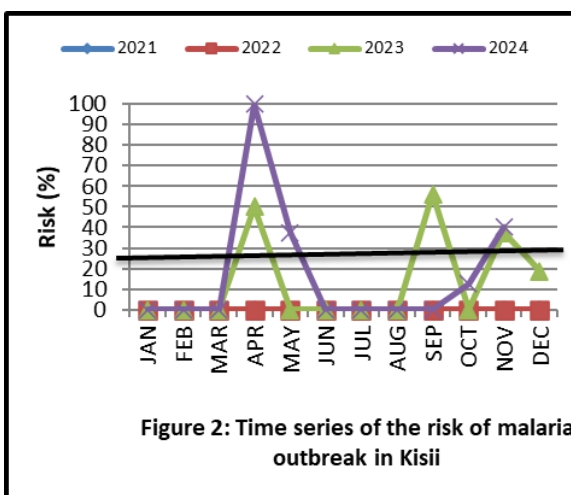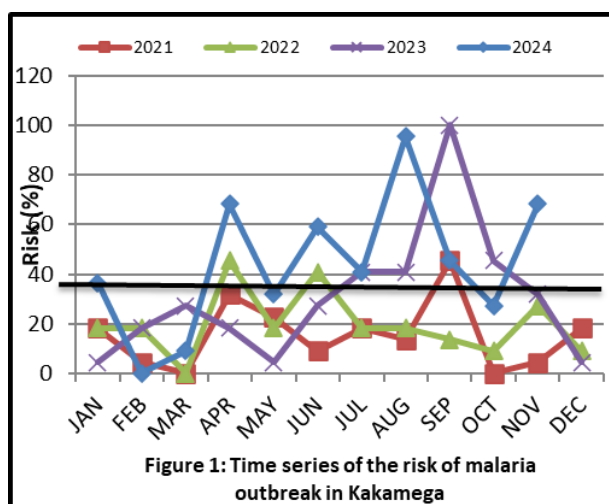**Table 3: NANDI MALARIA EPIDEMIC EARLY PREDICTION SYSTEM**

Yr	Mon	Tmax (^{0}C)	Mean Tmax (^{0}C)	Tmax Dev.	Tmin	Mean Tmin	Tmin Dev. /anom	Total Temp Dev. /Anom.	R/fall (mm)	Temp Dev. Filters	R/fall Filters	Multiplicative Model

2024	01	24.4	23.3	1.1	13.3	10.9	2.4	3.5	303.8	4	3	**75**
2024	02	26.4	23.2	3.2	12.5	11.7	0.8	4.0	123.8	5	0	**0.0**
2024	03	27.7	23.0	4.7	12.1	11.5	0.6	5.3	150.3	5	0	**0.0**
2024	04	24.4	22.8	1.8	16.8	11.2	5.6	7.2	366.3	5	4	**100**
2024	05	24.8	22.7	2.1	12.1	10.7	1.4	3.5	273.0	4	2	**50**
2024	06	24.3	22.7	1.6	16.8	10.9	5.9	7.5	136.5	5	0	**0.0**
2024	07	24.8	22.8	2.0	12.1	10.6	1.5	3.5	203.3	4	1	**20**
2024	08	24.0	23.1	0.9	11.7	10.8	0.9	1.9	246.9	2	1	**25**
2024	09	24.8	23.3	1.5	11.2	11.1	0.1	1.6	179.8	2	0	**0.0**
2024	10	25.1	23.3	1.8	12.0	10.7	1.3	3.0	186.9	9	4	**0.0**
2024	11	23.7	23.3	0.4	12.3	10.8	1.5	1.8	373.4	2	4	**40.0**

The maximum temperature in Nandi indicates a decrease from 25.1°C in October, 2024 to 23.7°C in November, 2024. This observation in November, 2024 for Nandi was positive (0.4°C above the mean of the month). Rainfall increased from 186.9mm in October, 2024 to 373.4mm in November, 2024. The additive model percentage risk in November, 2024 was **40.0%.**

Box 3:
For Nandi, epidemic threshold level is 20%.

Hence, there is high of malaria epidemic in Nandi in the month of December, 2024 and January, 2025. (See Figure 3)

Figure 1: Time series of the risk of malaria outbreak in Kakamega

Figure 2: Time series of the risk of malaria outbreak in Kisii

Figure 3: Time series of the risk of malaria outbreak in Nandi
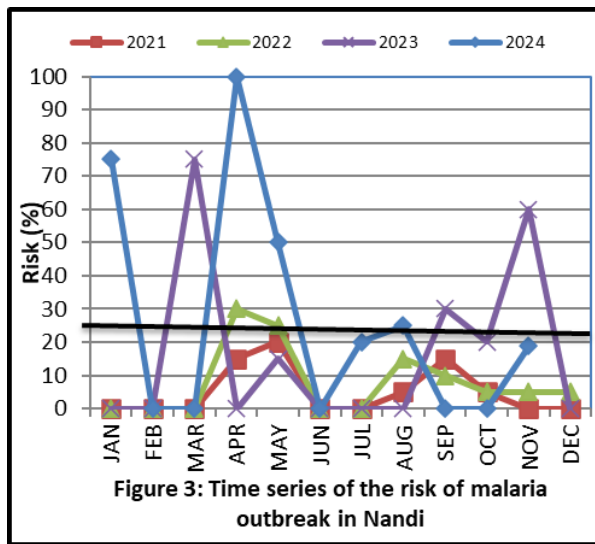
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