

Federal Democratic Republic of Ethiopia

Ministry of Water, Irrigation and Electricity

National Meteorological Agency

Applied Meteorological Services Case Team

Climate Information

For

The Health Sector

March 2018

Volume XI, No. 11

Foreword

This "Climate Information for the Health Sector" Bulletin has been designed to convey essential information regarding the monitoring of human comfort conditions based on the analysis of temperature and humidity data and also for the monitoring of Malaria outbreak areas based on the analysis of temperature and precipitation data.

Since the monitoring of temperature and rainfall over a given area can be used to assess the likelihood of outbreak of Malaria with a lag of two months, this information can be an important for early warning tool if used judiciously.

The major objective of this bulletin is in line with the National Meteorological Agency's strategy of diversifying climate application products to the basic developmental sectors (such as the Health, the water, the agricultural sector etc...). This bulletin can be a very important source of information to Health professionals engaged in the monitoring of Public Health, to Tourism Agents and institutions who advise tourists regarding the comfort conditions of the places to be visited by the tourists and to the researcher who is interested in the field of Bio-Climatology.

We have the opinion that careful and continuous use of this bulletin can benefit to the improvement of early warning and preparedness in the Health sector.

Meanwhile, your comments and constructive suggestions are highly appreciated to make the objective of this bulletin a success,

This same bulletin can be accessed online at: <http://www.meteo-ethiopia.net/health.htm>

Director General

NMA

P.O.Box 1090

Tel: 251(0)11 6615779

FAX 251(0)11 6625292

E-mail: nmsa@ethionet.et

Web: www.ethiomet.gov.et

Addis Ababa

Ethiopia

1. Rainfall, Temperature and Humidity Conditions during march 2018.

Based on the national meteorological data of march 2018 report; total amount of monthly rainfall 80 mm and above, monthly mean relative humidity 60% and above were recorded over the southeastern and southern border of Oromia and SNNPR. Similarly the distribution of rainfall was recorded highest to normal over most parts of the country while in Belg rain benefiting area was average to v.much below average except southern border area of SNNPR and Oromia was above average to v.much above average.; accordingly Average to highest in the record rainfall distribution was registered over most western, south western and south eastern portion of the country.

Regarding rainfall, humidity and rainfall deciles outputs, normal and above rainfall amount was recorded over most parts of the country; as a result most Western, north Western, southern and south eastern portion of the country recorded above normal rainfall, as a result favorable for the existence and distribution of malaria was observed over those areas of the country during the month of March 2018 (fig.1a), (fig. 1b) and (fig.2b).

As per Grover-Kopek et al. 2006, the climatic conditions is favorable for transmission of malaria in Africa are; when the monthly precipitation accumulation is at least 80 mm, the monthly mean temperature is between 18°C and 32°C and the monthly mean relative humidity is at least 60%.; Accordingly the same method was applied on Temperature, Rainfall and Humidity using meteorological data of March 2018 collected from some representative meteorological stations of Ethiopia in order to demarcate all the possible malaria expected areas of the country (fig. 4).

On the basis of the above principle and other related output like the deciles map (fig. 1b), assessments of March 2018 rainfall, temperature and humidity with respect to the distribution of malaria, values of monthly mean temperature 18°C to 32°C was observed over most lowland areas except the central and eastern highland parts of the country and those areas of the country was shaded in deep blue color (fig. 2a). At the same time most southern and south eastern parts of the country recorded above 80 mm of monthly total rainfall (fig. 1a). At the same time, 60% and above monthly mean relative humidity was recorded over the similar most southern and south eastern parts of the country (fig. 2b). Based on the above explained the climatic conditions for favorable for the survival and distribution of malaria was observed over most lowland areas of southern border area of Oromia, and SNNPR during the month of March 2018 (fig.4).

For furthermore and detailed information with respect malaria, the monthly mean minimum and maximum temperatures summary maps of March 2018 were posted on page four, (figures 3 (a) and 3(b)).

In principle, areas of favorable climate conditions for the existence and distribution of malaria can be summarized as follows;
if there is an area which satisfies the above three stated conditions with respect to the current monthly rainfall, temperature and humidity data; that specific portion of the area will be clearly marked in light yellowish background which is superimposed with red square pattern (fig.4).

Rainfall, Temperature and Humidity Assessment during the month of March 2018.

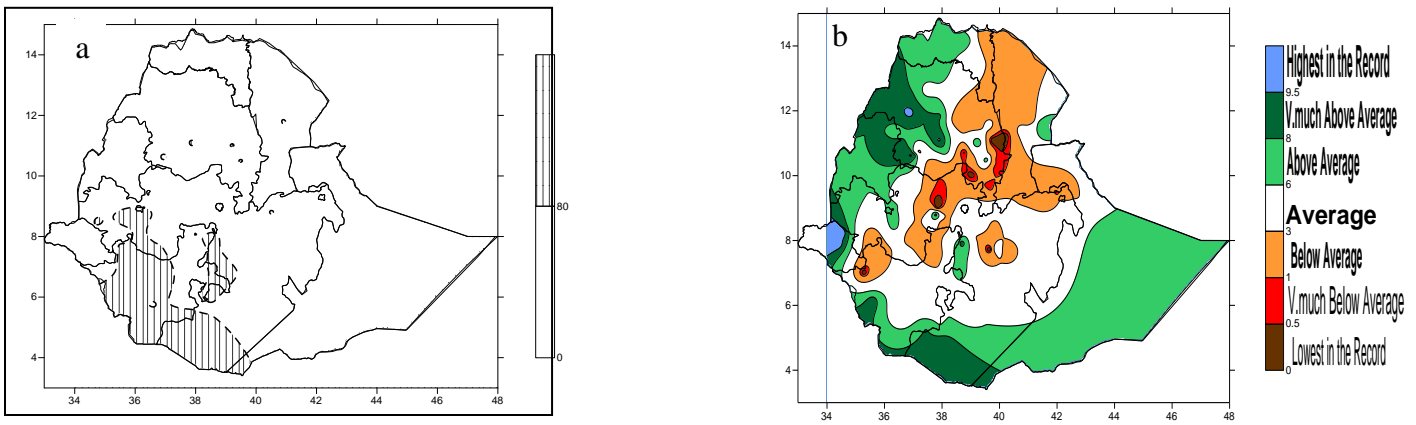


Fig. 1:- Rainfall assessment of March 2018.

(a) Monthly total rainfall amount of March 2018 in mm. Hatched areas had monthly rainfall amount of 80mm and above

(b) Rainfall deciles of March 2018. Areas shaded in green color indicate wetter than normal condition, while areas shaded in red color indicate rainfall deficiency.

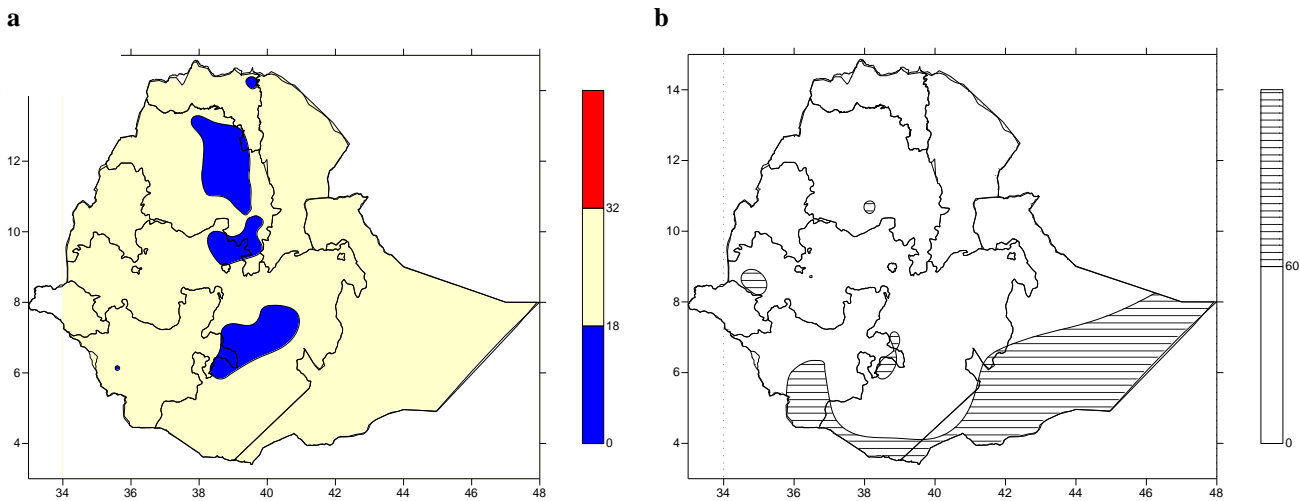


Fig. 2:- Temperature and relative humidity assessment of March 2018.

(a) Monthly mean temperature in degree centigrade of March 2018. Areas shaded in light yellowish color had monthly mean temperature of 18 to 32 °C and areas with temperature greater than 32°C shaded in red color while areas shaded in deep blue color had monthly mean temperature less than 18 °C

(b) Monthly average relative humidity in % of March 2018. Hatched areas had monthly average Relative humidity of 60% and above.

Average temperatures for the month of March 2018.

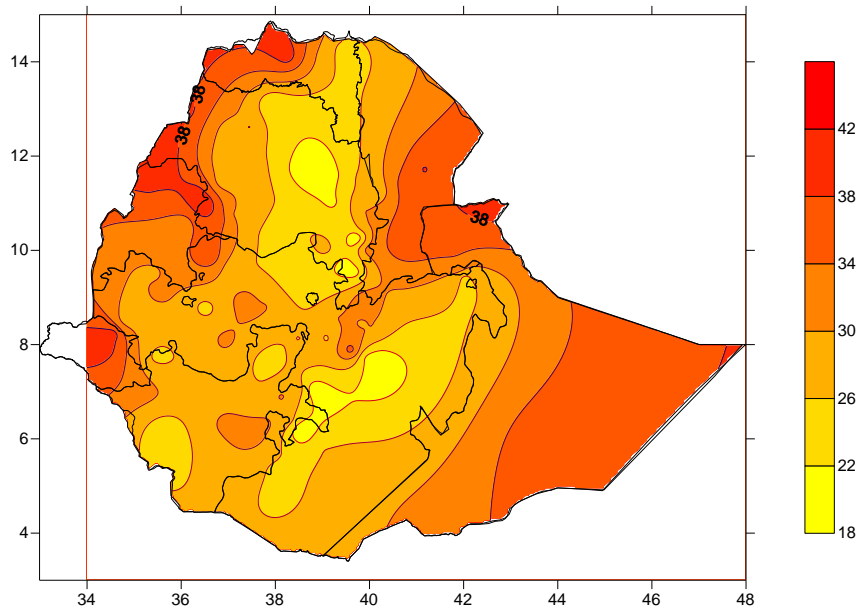


Fig 3:- (a). Mean maximum temperature in degree Celsius during March 2018.

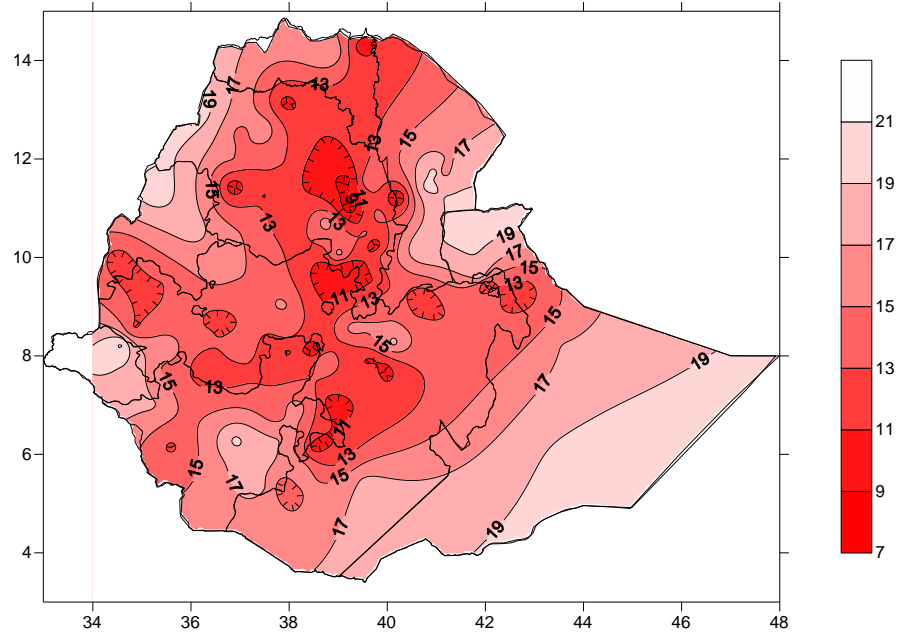


Fig 3:- mean minimum Temperature in degree Celsius for the month of March 2018.

Malaria prone areas during the month of March 2018.

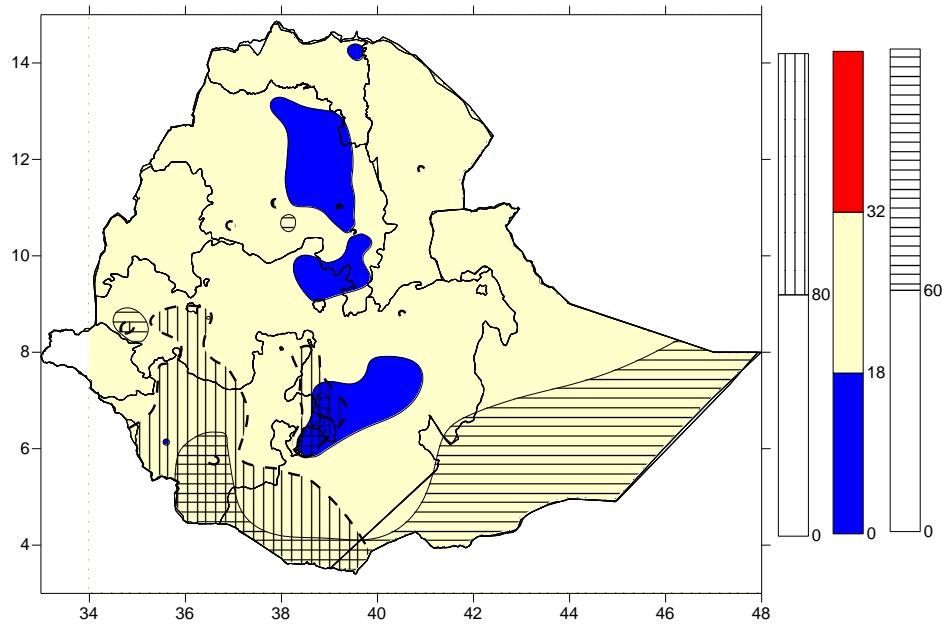


Fig 4:- Combined temperature, rainfall and relative humidity analysis for March 2018. Areas under square patterns with yellowish background color are assumed to satisfy favorable climatic conditions for malaria.

The above combined map was proposed to show the effect of monthly temperature, rainfall and relative humidity with respect to the survivable and distribution of malaria during the month of March 2018. Regarding to this issue; Areas under red squared patterns with light yellowish background colors are assumed to satisfy suitable climatological condition for the existence and distribution of malaria whereas areas whose monthly average temperature below 18°C and lowland areas whose monthly average temperature greater than 32°C are marked in deep blue and red color respectively and those portions of the country were not favorable for the distribution of malaria.

According to the above principle; areas whose average temperature between 18 and 32 degree Celsius, total rainfall 80 mm and above together with a monthly average relative humidity of 60% and above were observed over the western, southern, eastern lowland areas of the country; *Therefore climatic conditions were favorable for the survival and distribution of malaria over most lowland areas of western pocket and southern border area of Oromia and south eastern area of SNNPR during March 2018* (fig. 4).

In general, the rainfall, temperature and humidity 'RTH' values with respect to survivable and distribution malaria; if the current monthly assessment of temperature, rainfall and humidity satisfy the above conditions, the climate condition over that specific area automatically considered as favorable for the survival and distribution of malaria and that portion of the country will be marked in light yellowish background color superimposed with red square pattern.

2. Temperature Humidity Index (THI) Conditions during March 2018.

With respect to Temperature-Humidity Index (THI), the climatic condition for human being was developed by the US weather Bureau in 1959; it is applied to the temperature and humidity datum over representative stations of the country in order to review the weather condition which was comfort, moderate and discomfort over all areas covered by indicated climate data sources during the month of March 2018. According to this approach, if the 'THI' values exceed 26 almost all the population feel uncomfortable (here we refer to it as "uncomfortable"), if the "THI" values between 21 to 26 half of the population feel uncomfortable (here we refer to it as "moderate") and if the THI values are less than 21 almost all the population feel comfortable (here we refer to it as "comfortable") with respect to heat stress.

According to the "THI" values of the above table, the degree of human comfort with respect to heat stress can be expressed as; uncomfortable condition which was recorded over Metehara 18 days out of 30 days and Direedawa 1 days out of 31 days; as a result uncomfortable conditions were observed over the eastern half lowland areas; yet comfortable and moderate conditions were dominating over

rest most parts of the country during the month of March 2018. On the other hand high land areas like Bale robe, Debremarkos, Addis Ababa Gore and Mekele were stayed comfortable for more than 77% of the observation days; furthermore the rest most parts of the country were remained moderate for more than 85% of the observation days. In most cases, both comfortable and moderate conditions with respect to heat stress were dominating over most parts of the country during the month of March 2018 (table 1).

Frequency of temperature-humidity Index (THI) during the month of March 2018.

No	Oct. 2017	<21(Comfortable)	21-26(Moderate)	>26(Uncomfortable)	TOTAL
1	<i>Mekele</i>	30	1	0	31
2	<i>Gondar</i>	6	25	0	31
3	<i>Bahirdar</i>	1	30	0	31
4	<i>Combolcha</i>	9	22	0	31
5	<i>Debremarkos</i>	31	0	0	31
6	<i>Nekemte</i>	17	14	0	31
7	<i>Jimma</i>	2	29	0	31
8	<i>Gore</i>	22	9	0	31
9	<i>Addisababa</i>	31	0	0	31
10	<i>Debrezeit A.F</i>	9	19	1	29
11	<i>Metehara</i>	2	10	18	30
13	<i>Awassa</i>	3	28	0	31
14	<i>Diredawa</i>	2	28	1	31
15	<i>Balero</i>	30	0	0	30
16	<i>Gode</i>	0	0	0	0
17	<i>Arbminch</i>	0	27	2	29
18	<i>Negele</i>	11	20	0	31

Table 1:- Temperature Humidity Index (THI) values for some selected stations during the month of March 2018.

Reference: - Grover-Kopec et al. 2006 - Web-based climate information resources for malaria control in Africa, Malar J. 2006; 5: 38. Published online 2006 May11. doi: 10.1186/1475-2875-5