

**Table S1: Time series models to predict *Plasmodium falciparum* malaria incidence at different locations in south Ethiopia**

Location (Health centre, unless specified)	Altitude	Available data used (Temperature- Max and Min)	Model Structure (ARIMA)	Goodness of fit ( $R^2$ , if *: stationary $R^2$ )	Significant Variables and model description	Serial Length	Average Incidence per month
Daramalo Wacha	1182	Incidence Rainfall	(1,0,0)(0,0,0)	0.56	<b>Incidence</b> (SQR) at lag 1 <b>Rainfall</b> at delay 2 and numerator TF order of 0.	68 (Mar 2002-Oct 2007)	45
Tepi	1205	Incidence Temperature Rainfall	(1,0,0)(0,0,0)	0.30	<b>Incidence</b> (LN) at AR lag 1	117 (Jan 1998-Sep 2007)	57
Arba Minch	1220	Incidence Temperature Rainfall Relative Humidity	(0,1,6)(0,0,0)	<b>0.53*</b>	<b>Incidence</b> (LN) at MA lag 1 and 6 and first order non-seasonal differencing <b>Min temperature</b> (LN) at delay 4, numerator TF order of 0 and first order non-seasonal differencing	118 (Jan 1998-Oct 2007)	83
Mirab Abaya	1221	Incidence Temperature Rainfall Relative Humidity	(0,0,0)(0,0,0)	0.30	<b>Max temperature</b> (LN) at delay 4, numerator TF order of 0, denominator TF orders of 1 and 2	105 (Feb 1999-Oct 2007)	54
Bele	1240	Incidence Rainfall	(1,0,0)(0,0,0)	0.64	<b>Incidence</b> at AR lag 1	64 (Jul 2002-Oct 2007)	133
Tercha <i>Hospital</i>	1335	Incidence Temperature Rainfall	Model ignored (Ljung-Box Q P value <0.05)			63 (Aug 2002-Oct 2007)	53
Jinka <i>Hospital</i>	1373	Incidence Temperature Rainfall	Model ignored (Ljung-Box Q P value <0.05)			62 (Jul 2002-Aug 2007)	126
Sawla	1380	Incidence Temperature Rainfall	(2,0,0)(0,0,0)	0.69	<b>Incidence</b> at AR lags 1 and 2	81 (Dec 2000-Aug 2007)	91

**Table S2: Time series models to predict *Plasmodium falciparum* malaria incidence at different locations in south Ethiopia**

Location (Health centre, unless specified)	Altitude	Available data used (Temperature- Max and Min)	Model Structure (ARIMA)	Goodness of fit ( $R^2$ , if *: stationary $R^2$ )	Significant Variables and model description	Serial Length	Average Incidence per month
Konso Karat	1431	Incidence Temperature Rainfall	(1,0,0)(0,0,0)	0.94	<b>Incidence</b> at AR lag 1 <b>Rainfall</b> at delay 2, numerator TF orders of 0, 1 and 2, and denominator TF orders of 1 and 2.	118 (Jan 1998-Oct 2007)	64
Gesuba	1552	Incidence Temperature Rainfall	(0,0,0)(0,0,0)	-0.03	<b>Min temperature</b> (LN) at numerator TF order of 0	64 (Jul 2002-Oct 2007)	62
Bedesa	1609	Incidence Rainfall	(1,0,0)(0,0,0)	0.65	<b>Incidence</b> at AR lag 1	53 (Jun 2003-Oct 2007)	65
Humbo Tebela	1618	Incidence Rainfall	(0,0,0)(0,0,0)	0.19	<b>Rainfall</b> at numerator TF orders of 0, 1 and 2	64 (Jul 2002-Oct 2007)	98
Amaro Kele	1659	Incidence Temperature Rainfall	(1,0,0)(0,0,0)	0.77	<b>Incidence</b> at AR lag 1	97 (Sep 1999-Sep 2007)	24
Cheleklektu	1701	Incidence Rainfall	(1,0,0)(0,0,0)	0.21	<b>Incidence</b> (LN) at AR lag 1	75 (Sep 1999-Nov 2005)	24
Wondo Genet	1742	Incidence Rainfall	(0,0,2)(1,0,0)	0.97	<b>Incidence</b> at non-seasonal MA lag 2 and Seasonal AR lag 1	118 (Jan 1998-Oct 2007)	90
Areka	1752	Incidence Rainfall	(0,1,0)(0,0,0)	<b>0.55*</b>	No significant predictor	118 (Jan 1998-Oct 2007)	353
Alaba	1772	Incidence Temperature Rainfall	(0,1,1)(0,0,0)	0.46	<b>Incidence</b> (LN) at first order of non- seasonal differencing and MA lag 1 <b>Min temperature</b> (LN) at numerator TF order of 0, first order of non-seasonal and seasonal differencing	64 (Jul 2002-Oct 2007)	302
Yirg Alem	1786	Incidence Temperature Rainfall	Model ignored (Ljung-Box Q P value <0.05)			64 (Jul 2002-Oct 2007)	45

**Table S3: Time series models to predict *Plasmodium falciparum* malaria incidence at different locations in south Ethiopia**

Location (Health centre, unless specified)	Altitude	Available data used (Temperature- Max and Min)	Model Structure (ARIMA)	Goodness of fit ( $R^2$ , if *: stationary $R^2$ )	Significant Variables and model description	Serial Length	Average Incidence per month
Kebado	1807	Incidence Rainfall	Model ignored (Ljung-Box Q P value <0.05)			64 (Jul 2002-Oct 2007)	23
Wolayta Soddo	1854	Incidence Temperature Rainfall Relative Humidity	(1,0,0)(0,0,0)	0.36	<b>Incidence</b> (LN) at AR lag 1	65 (Jul 2002-Nov 2007)	42
Koshe	1876	Incidence Rainfall	(1,0,0)(1,1,0)	<b>0.91*</b>	<b>Incidence</b> at AR lag 1 (both non- seasonal and seasonal) and first order of seasonal differencing	89 (Sep 1998-Jan 2006)	63
Wolkite	1884	Incidence Rainfall	(0,1,0)(1,1,0)	<b>0.86*</b>	<b>Incidence</b> at AR lag 1 (seasonal), non- seasonal and seasonal first order of differencing	118 (Jan 1998-Oct 2007)	151
Kemba	1895	Incidence Rainfall	(1,0,0)(0,0,0)	0.62	<b>Incidence</b> at AR lag 1	52 (Jul 2003-Oct 2007)	51
Laska	1910	Incidence Rainfall	(1,0,0)(0,0,0)	0.67	<b>Incidence</b> at AR lag 1	56 (Feb 2003-Sep 2007)	30
Aleta Wondo	1947	Incidence Rainfall	(0,0,1)(0,1,0)	<b>0.88*</b>	<b>Incidence</b> at MA lag 1 and first order seasonal differencing	86 (Sep 2000-Oct 2007)	43
Derara	1950	Incidence Rainfall	(1,0,0)(0,0,0)	0.89	<b>Incidence</b> at AR lag 1	94 (Jan 2000-Oct 2007)	73
Shone	1959	Incidence Rainfall	Model ignored (Ljung-Box Q P value <0.05)			64 (Jul 2002-Oct 2007)	98
Tora	1987	Incidence Rainfall	(0,0,0)(0,0,0)	0.30	No significant predictor	60 (Nov 2002-Oct 2007)	69
Yirba	2023	Incidence Rainfall	(1,0,0)(1,0,0)	0.68	<b>Incidence</b> at AR lag 1 (both non- seasonal and seasonal)	63 (Jul 2002-Sep 2007)	92

**Table S4: Time series models to predict *Plasmodium falciparum* malaria incidence at different locations in south Ethiopia**

Location (Health centre, unless specified)	Altitude	Available data used (Temperature- Max and Min)	Model Structure (ARIMA)	Goodness of fit ( $R^2$ , if *: stationary $R^2$ )	Significant Variables and model description	Serial Length	Average Incidence per month
Boditi	2043	Incidence Temperature Rainfall	(2,0,0)(0,0,0)	0.16	<b>Incidence</b> (LN) at AR lag 1 and 2	89 (May 2000-Sep 2007)	98
Buee	2054	Incidence Rainfall	(1,0,0)(1,0,0)	0.60	<b>Incidence</b> (LN) at AR lag 1 (both non- seasonal and seasonal) <b>Rainfall</b> at delay 3 and numerator TF order of 0.	86 (Sep 2000-Oct 2007)	30
Butajira	2074	Incidence Temperature Rainfall	(1,0,0)(0,0,0)	0.94	<b>Incidence</b> at AR lag 1	118 (Jan 1998-Oct 2007)	50
Hossana	2306	Incidence Temperature Rainfall	(2,1,1)(0,0,0)	<b>0.66*</b>	<b>Incidence</b> at AR lag 1 and 2, first order of differencing and MA lag 1	64 (Jul 2002-Oct 2007)	56
Angacha	2331	Incidence Temperature Rainfall	(1,0,0)(0,0,0)	0.39	<b>Incidence</b> (LN) at AR lag 1 <b>Min temperature</b> (LN) at delay 5 and numerator TF orders of 0	64 (Jul 2002-Oct 2007)	14
Arbegona	2582	Incidence Temperature Rainfall	(0,0,0)(0,0,0)	0.62	<b>Max temperature</b> at delay 2 and numerator TF orders of 0 and 2. <b>Min temperature</b> at delay 2 and numerator TF orders of 0	51 (Mar 2003-May 2007)	30
Mean condition of 23 locations		Incidence Rainfall	(1,0,0)(0,1,0)	<b>0.67*</b>	<b>Incidence</b> at AR lag 1 and first order seasonal differencing <b>Rainfall</b> at delay 4 and numerator TF order of 0 and first order seasonal differencing	62 (Jul 2002-Aug 2007)	2579
Mean condition of 14 locations		Incidence Temperature ±Rainfall	Model ignored (Ljung-Box Q P value <0.05)			51 (Mar 2003-May 2007)	1146