Supplementary Material 1: History of onchocerciasis control in Togo and modelled infection trends in villages without recorded baseline microfilarial prevalence

Reaching Elimination of Onchocerciasis Transmission with Long-term Vector Control and Ivermectin Treatment in West Africa: The Example of Togo

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Text S1. Togo heterogeneous onchocerciasis endemicity and history of control

S1.1 Onchocerciasis pre-control endemicity in Togo

Figure S1 illustrates baseline endemicity across Togo, according to different data sources and methodological approaches. The maps for Togo, and its regions and prefectures were drawn using the R package *geodata* version 0.6-2 (https://github.com/rspatial/geodata). Panel A shows endemicity based on initial (1970-76) surveys by the Onchocerciasis Control Programme in West Africa (OCP) at the prefecture level (village-specific data not available) [1,2]. Panel B presents endemicity for villages with recorded baseline microfilarial prevalence (BMP) (Text S2 describes data sources). Panel C integrates endemicity for villages with and without recorded BMP. For the latter, putative BMP was inferred from subsequent surveys and EPIONCHO-IBM simulations (Figures S8-S14). Panel D depicts a synthesised map of endemicity across Togo, combining information from Panels A and C. In Figures S1B-S1C, endemicity levels are categorised based on BMP as: non-endemic (0%); hypoendemic (>0% but <40%); mesoendemic (≥40% but <60%); hyperendemic (≥60% but <80%); holoendemic (≥80%). In Figures S1A and S1D, non-endemic and hypoendemic categories have been combined (<40%).

Table S1 summarises the data used in this work for 400 onchocerciasis-endemic villages organised by Togo regions, prefectures and endemicity levels. The few hypoendemic villages with recorded BMP are likely not to be representative of the true number of hypoendemic villages in Togo. During the OCP, the goal was the elimination of onchocercal blindness as a public health problem (EPHP) and, therefore, most survey efforts focused on highly-endemic villages (those closest to vector breeding sites and with high blindness prevalence) [1]. Onchocerciasis is highly focal and most prevalent in rural populations living in close proximity to vector breeding sites [3]. In Togo, the onchocerciasis vectors belong to the *Simulium damnosum sensu lato* (s.l.) species complex [4].

Savanes and Kara regions have fewer villages with recorded BMP (21%) than Centrale, Plateaux and Maritime (44%; chi-square p-value<0.001). Vector control (VC) started earlier in the former two regions [5]. The region with the largest rural population is Plateaux, whereas Savanes is the most rural region. Maritime is the most populated region, with the majority of its population residing in urban areas, and hence the least onchocerciasis-endemic region (see Text S2 and Figure S5 for data sources) [6].

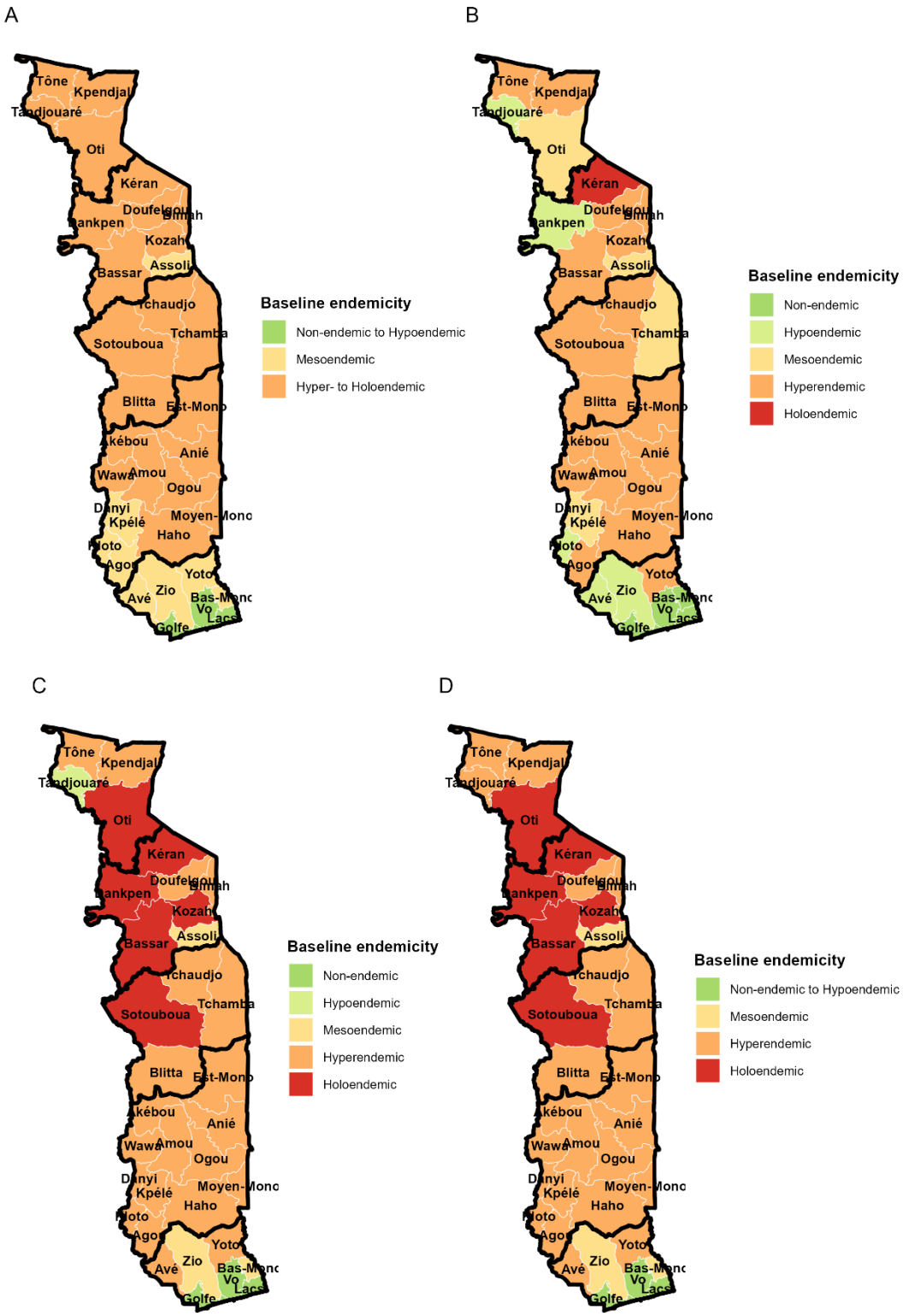

Figure S1. Baseline endemicity of onchocerciasis across Togo by prefecture. *A*, Endemicity based on initial Onchocerciasis Control Programme in West Africa (OCP) surveys (1970-76) [1,2]. *B*, Endemicity based on villages with recorded baseline microfilarial prevalence (BMP, data sources described in Text S2). *C*, Endemicity based on both villages with and without recorded BMP. *D*, Map synthesising data from *A* and *C*. In S1B-S1C, endemicity levels are categorised based on BMP as: non-endemic (0%); hypoendemic (>0% but <40%); mesoendemic (≥40% but <60%); hyperendemic (≥60% but <80%); holoendemic (≥80%). In S1A and S1D, non-endemic and hypoendemic categories have been combined (<40%). Black thick borders indicate regions: from North to South: Savanes, Kara, Central, Plateaux and Maritime. White thin borders denote prefectures up to 2012 (see Table S1).

Table S1. Number of villages surveyed for *Onchocerca volvulus* microfilariae per region, prefecture and endemicity level in Togo

Region Prefecture[a]	**Total No. of villages surveyed**	**Endemicity level according to baseline microfilarial prevalence (BMP)**				**Without recorded BMP (%)**	**Proportion of overall population** (%)	**Proportion of rural population**[b] (%)	**Observations** (Modelled prevalence trends followed by villages without BMP)
		Hypoendemic	**Mesoendemic**	**Hyperendemic**	**Holoendemic**				
Savanes	49	4	5	3	–	37	13.4	18.4	
Kpendjal, including Kpendjal-Ouest	9	–	1	1	–	7	2.5	3.9	Hyperendemic
Oti, including Oti-Sud	29	1	2	–	–	26	3.1	4.3	Hypo- to Holoendemic
Tandjoaré or Tandjouaré	5	3[c]	–	–	–	2	1.9	3.0	–
Tône, including Cinkassé	6	–	1 + 1[c]	1 + 1[c]	–	2	4.6	5.9	–
Kara	88	2	4	7	2	73	12.4	15.2	
Assoli	3	1	1	–	–	1	0.8	0.9	Hypoendemic
Bassar	17	–	1	2	–	14	1.9	2.5	Hypo- to Holoendemic
Binah/Bimah	4	–	2[c]	1[c]	–	1	1.1	1.7	–
Dankpen	19	1	–	–	–	18	2.1	3.1	Hypo- to Holoendemic
Doufelgou	5	–	–	2	–	3	1.3	1.5	Meso- to Hyperendemic
Kéran	13	–	–	–	2	11	1.5	2.1	Hyper- to Holoendemic

Table S1. Continued

Region Prefecture[a]	**Total No. of villages surveyed**	**Endemicity level according to baseline microfilarial prevalence (BMP)**				**Without recorded BMP (%)**	**Proportion of overall population** (%)	**Proportion of rural population**[b] (%)	**Observations** (Modelled prevalence trends followed by villages without BMP)
		Hypoendemic	**Mesoendemic**	**Hyperendemic**	**Holoendemic**				
Kozah	27	–	–	2	–	25	3.7	3.4	Hypo- to Holoendemic
Centrale	86	13	26	7	–	40	10.0	12.1	
Blitta	28	7	5	5	–	11	2.2	3.3	Hypo- to Hyperendemic
Sotouboua, including Mô	34	3	10	–	–	21	2.0	2.5	Hypo- to Holoendemic
Tchamba	16	2	8	–	–	6	2.1	2.8	Hypo- to Hyperendemic
Tchaoudjo/Tchaudjo	8	1	3	2	–	2	3.1	2.5	Hypoendemic
Plateaux	136	16	27	25	–	68	22.2	28.6	
Agou	13	1	–	1	–	11	1.4	2.1	Hypo- to Hyperendemic
Akébou	2	1	–	1	–	–	1.0	1.4	–
Amou	8	–	1	1	–	6	1.7	2.6	Hypo- to Hyperendemic
Anié	12	2	3	2	–	5	1.5	1.5	Hypo- to Hyperendemic
Danyi	5	0	3	–	–	2	0.6	0.9	Meso- to Hyperendemic
Est-Mono	15	4	7	4	–	–	2.0	3.0	–

Table S1. Continued

Region Prefecture[a]	**Total No. of villages surveyed**	**Endemicity level according to baseline microfilarial prevalence (BMP)**				**Without recorded BMP (%)**	**Proportion of overall population** (%)	**Proportion of rural population**[b] (%)	**Observations** (Modelled prevalence trends followed by villages without BMP)
		Hypoendemic	**Mesoendemic**	**Hyperendemic**	**Holoendemic**				
Haho	21	3	3	3	–	12	4.0	5.5	Hypo- to Hyperendemic
Kloto	5	2	–	–	–	3	2.3	1.7	Hyperendemic
Kpélé	2	–	1	–	–	1	1.2	1.8	Hyperendemic
Moyen-Mono	6	1	2	3	–	–	1.2	1.8	–
Ogou	37	1	5	9	–	22	3.7	4.0	Hypo- to Hyperendemic
Wawa	10	1	2	1	–	6	1.6	2.3	Hypo- to Hyperendemic
Maritime	41	6	–	1	–	34	42.0	25.7	
Avé	5	1	–	–	–	4	1.6	2.4	Hypo- to Hyperendemic
Bas-Mono	2	–	–	–	–	2	1.4	2.1	Mesoendemic
Golfe, including Lomé and Agoè-Nyivé	0	–	–	–	–	–	25.3	2.4	Non-endemic
Lacs	0	–	–	–	–	–	2.8	3.8	Non-endemic
Vo	0	–	–	–	–	–	3.4	5.0	Non-endemic

Table S1. Continued

Region Prefecture[a]	**Total No. of villages surveyed**	**Endemicity level according to baseline microfilarial prevalence (BMP)**				**Without recorded BMP (%)**	**Proportion of overall population** (%)	**Proportion of rural population**[b] (%)	**Observations** (Modelled prevalence trends followed by villages without BMP)
		Hypoendemic	**Mesoendemic**	**Hyperendemic**	**Holoendemic**				
Yoto	22	2	–	1	–	19	2.7	3.7	Hypo- to Hyperendemic
Zio	12	3	–	–	–	9	4.8	6.3	Hypo- to Mesoendemic
Total	**400**	**41**	**62**	**43**	**2**	**252**	**100**	**100**	–

[a]Over the past 15 years, Togo has undergone administrative changes affecting its prefectures. In 2012, Tône was split into Tône and Cinkassé; Lacs was divided into Lacs and Bas-Mono (with the latter being historically known as the original onchocerciasis-endemic area of Lacs); Kloto was separated into Kloto and Kpélé; Ogou was divided into Ogou and Anié, and Wawa was divided into Wawa and Akébou. In 2018-19, Kpendjal was separated into Kpendjal-Ouest and Kpendjal; Oti was divided into Oti and Oti-Sud; Sotouboua was split into Sotouboua and Mô, and Lomé Capital comprised 5 prefectures.

[b]Proportion of the rural population of the total rural population in Togo.

[c]Recorded in 1970-74 preparatory surveys prior to the commencement of the OCP [1,7] (not in OCP database).

S1.2 History of onchocerciasis control in Togo

Most of the Togolese territory was gradually incorporated in the OCP (Figure S2A), firstly, in the programme's Phase II (upper left corner of Savanes), second in the Phase III East (rest of Savanes, Kara and upper part of Centrale), and finally in the Southern Extension (rest of Centrale, Plateaux and most of Maritime), beginning vector control (VC) with aerial larviciding in January 1976, March 1977 and February 1988, respectively [5]. The Southern Extension aimed to tackle the reinvasion of areas under VC by *Simulium damnosum* s.l. [8,9]. In 1987, delivery of annual ivermectin mass drug administration (MDA) started in the OCP area, in the first instance by mobile teams, and ultimately by community-directed distribution of ivermectin (CDTI), which aimed to expand geographical coverage and increase sustainability [9]. Combined larviciding and ivermectin treatment lowered transmission substantially, effecting a 90% reduction of the annual transmission potential (ATP, number of L3 larvae per person per year) after the first two years of implementation in some areas [8]. However, control was not effective in interrupting transmission around the Oti tributaries (Kara, Keran and Mô River basins) in Togo [8], where the entomo-epidemiological situation remained unsatisfactory, namely, in Kara and parts of Savanes and Centrale. Therefore, following the closure of the OCP in December 2002, some of Togo's persistent foci were included in Special Intervention Zones (SIZ) that were launched in December 2002 (Figure S2B), in which VC continued until 2007 and biannual ivermectin MDA was introduced from 2003 until 2012 [10,11].

In particular, aerial VC was extended in the Upper Oti River Basin of Savanes, where it was deemed to be necessary to further reduce prevalence and mitigate the risk of infection resurgence, and in all the major river basins of Kara, as well as the Mô River Basin of Centrale, until 2007 [12]. Concurrently with VC, biannual CDTI was implemented until 2012 in 11 SIZ prefectures with historically high onchocerciasis prevalence [12]. A portion of southeast Tône was also part of the SIZ but only received VC. Currently, the former SIZ area comprises 16 prefectures, as Tône was divided into Tône and Cinkassé; Kpendjal was divided into Kpendjal and Kpendjal-Ouest (Naki-Ouest); Oti into Oti and Oti-Sud, and Sotouboua into Sotouboua and Mô prefectures. As previously described, the maps for Togo, and its regions and prefectures shown in Figure S2 were drawn using the R package geodata version 0.6-2 (https://github.com/rspatial/geodata).

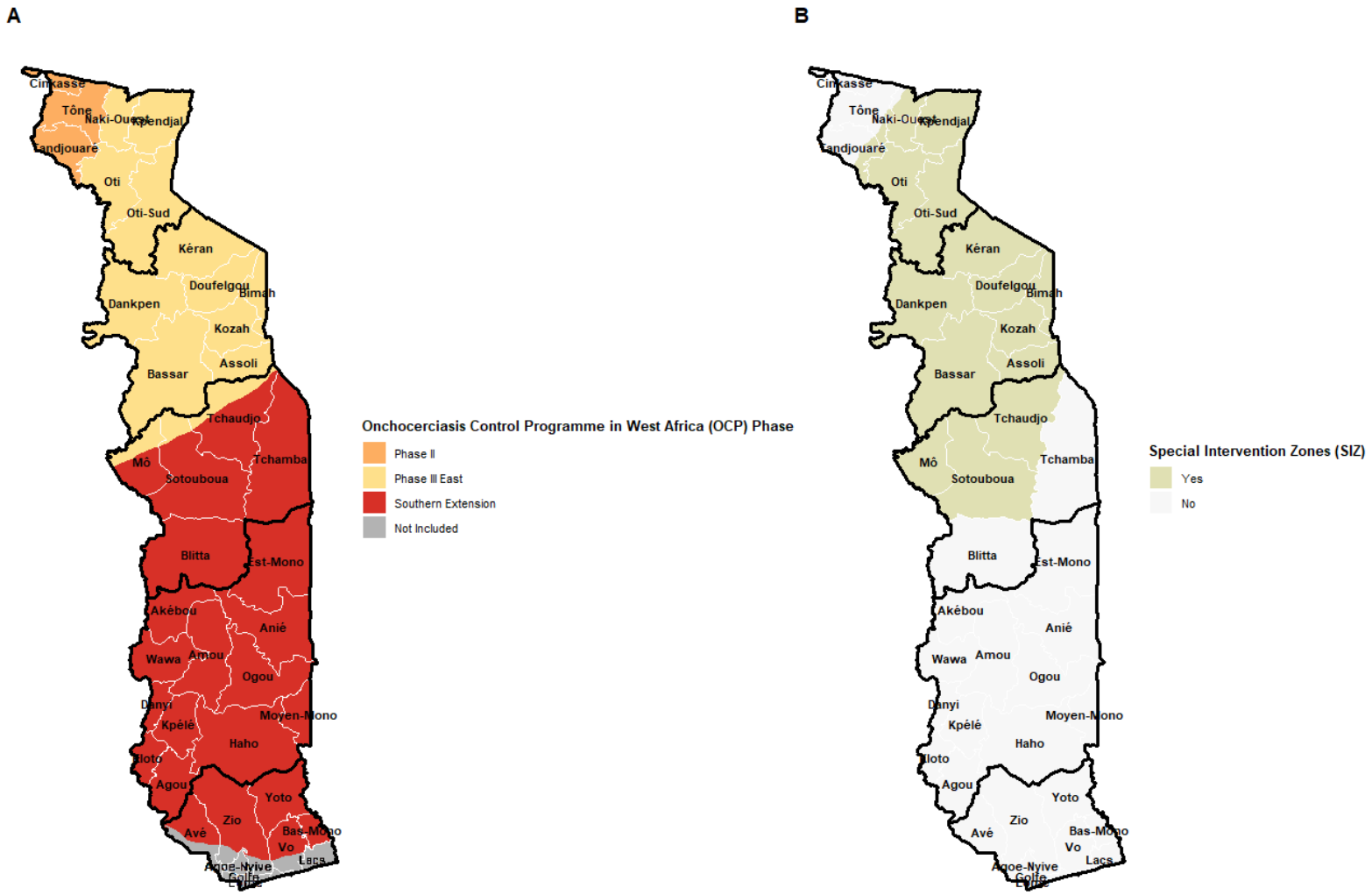

Figure S2. Onchocerciasis control in Togo. *A*, Phases under the Onchocerciasis Control Programme in West Africa (OCP). *B*, Special Intervention Zones (SIZ). Black thick borders indicate regions; white thin borders denote current prefectures. Data obtained from sources cited in Text S2 for OCP and SIZ.

Figure S3 illustrates trends in (crude) microfilarial prevalence from 1975 to 2017 in villages located in SIZ and non-SIZ areas. As the launch of SIZ started in December 2002, prior to this date all the villages would have been part of the OCP, but the colour coding helps to visualise the evolution of the prevalence situation from the beginning of the programme. Towards the end of the OCP, in the period between 1998 and 2002, the epidemiological situation in some villages was of great concern, with some villages exhibiting microfilarial prevalence as high as 60% in the would-be SIZ villages in contrast with a maximum of 25% in those which were not included in the SIZ. By 2007 (end of the extended VC period in SIZ areas), prevalence had declined to levels comparable to those of non-SIZ villages by the closure of the OCP.

Figure S4 presents box-and-whiskers plots comparing crude microfilarial prevalence between SIZ and non-SIZ villages for the periods of: a) 1998–2002 (nearing the end of the OCP), b) 2007–2011 (post-OCP and, in SIZ, with continuation of VC until 2007 and switch to biannual MDA from 2003), and c) 2012 –2017 (without VC but with continuation of biannual MDA in SIZ and of annual MDA in non-SIZ, with the exception of some areas of Plateaux (all non-SIZ) which switched to biannual MDA in 2014). In 1998–2002 (Figure S4A), microfilarial prevalence (compared using the Mann-Whitney U test) was significantly higher in the would-be SIZ villages compared to those which were not included in SIZ (p-value <0.001). In 2007–2011 (Figure S4B), microfilarial prevalence in SIZ villages decreased significantly compared to 1998–2002 (p-value <0.001) but remained higher than in non-SIZ (p-value = 0.008). In 2012–2017 (Figure S4C), prevalence in SIZ villages increased significantly compared to 2007–2011 (p-value = 0.005), and was higher than in non-SIZ villages (p-value <0.001).

After the closure of the OCP and the SIZ, the Ministry of Health (MoH) of Togo maintained annual or biannual MDA as they were during the SIZ [13]. Since 2002, the reported therapeutic coverage of ivermectin has been around 80% (of the total population) recommended for onchocerciasis elimination of transmission (EOT) [13]. Since 2014, the National Onchocerciasis Control Programme (NOCP) of the MoH extended biannual MDA from the 11 prefectures that were part of the SIZ to 16 prefectures, to include five additional prefectures in the Plateaux region, which at the time had microfilarial prevalence values exceeding 5% [14,15]. Villages with more than 2,000 inhabitants had not been incorporated in ivermectin MDA programmes until 2018-2020, as they were deemed to have a lower blindness risk [15,16]. A detailed record of onchocerciasis control history by region and prefecture is described in Table S2.

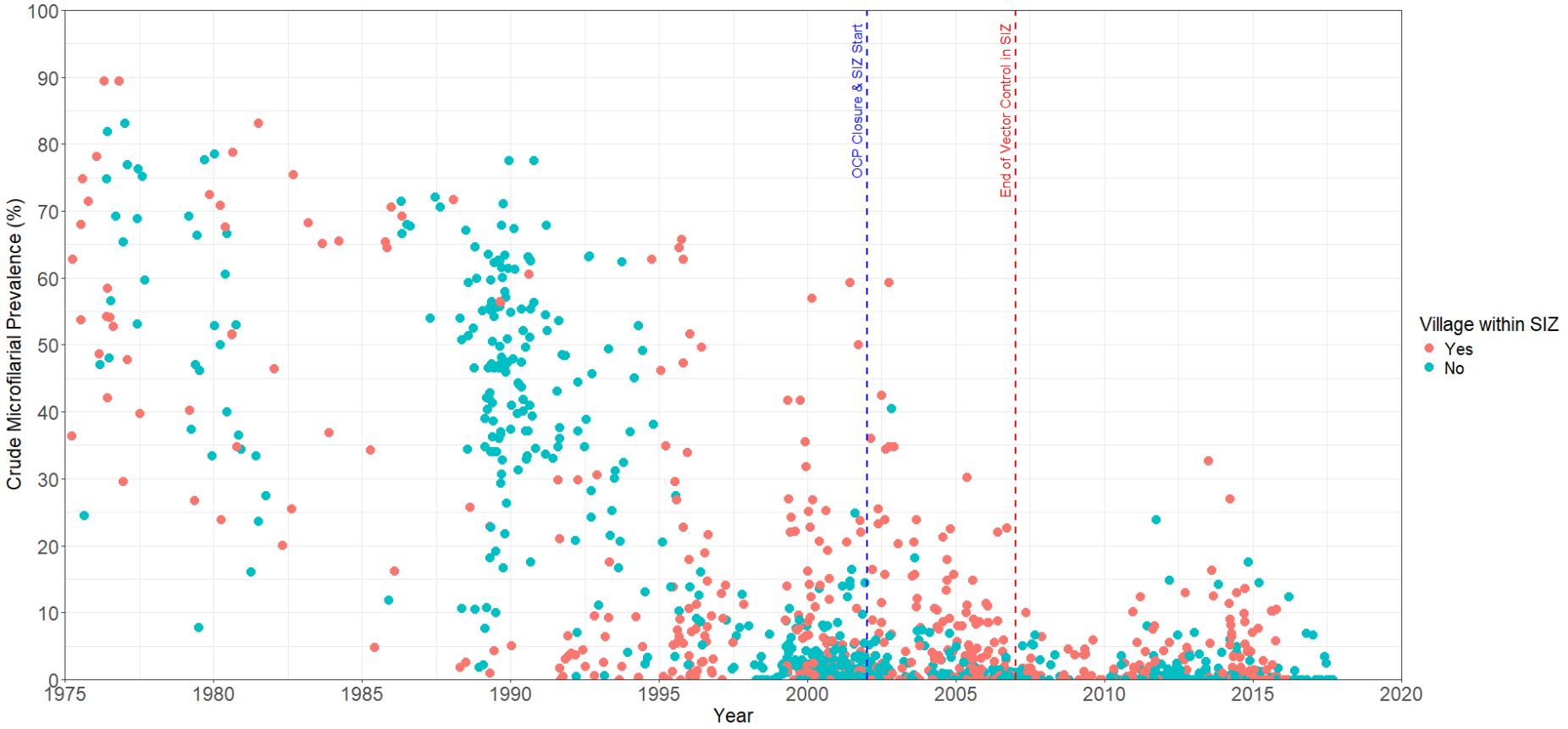

Figure S3. Temporal trends of crude microfilarial prevalence in villages located in Special Intervention Zones (SIZ) and non-SIZ areas from 1975 to 2017. Red circles represent villages located in SIZ areas; blue circles represent villages located in non-SIZ areas. The blue vertical dashed line indicates the end of the Onchocerciasis Control Programme in West Africa (OCP) and the start of SIZ in 2002; the red vertical dashed line indicates the end of vector control in SIZ villages.

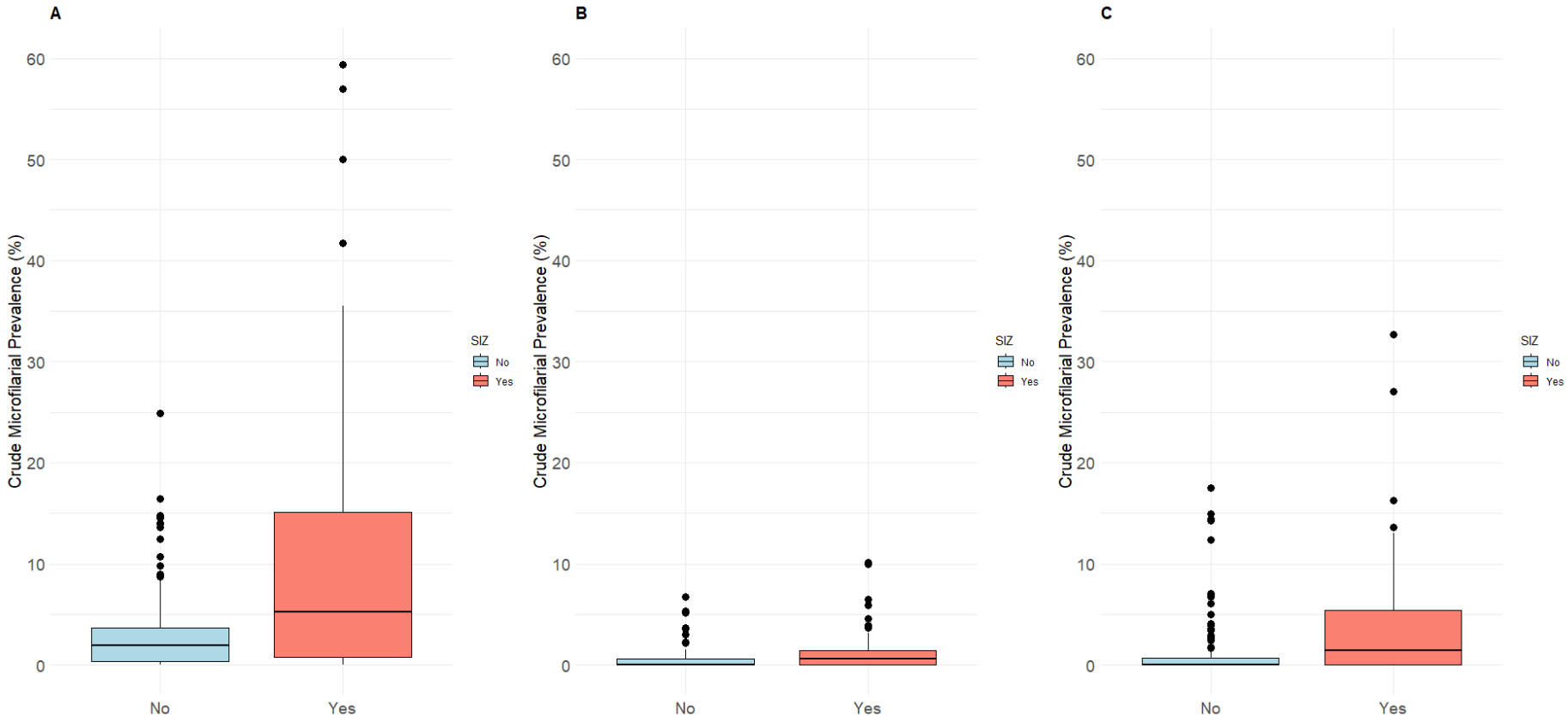

Figure S4. Box-and-whisker plots of crude microfilarial prevalence in non-SIZ (No) and SIZ (Yes) villages in Togo across different intervention periods. *A*, 1998–2002 (nearing the end of the OCP). *B*, 2007–2011 (post-OCP and, in SIZ, at the end of VC but continuing biannual MDA). *C*, 2012–2017 (under biannual and/or annual MDA but without VC). The horizontal lines within each box represent the median microfilarial prevalence, with the lower and upper box edges indicating the 25th and 75th percentiles, respectively (interquartile range, IQR). Whiskers extend to 1.5 times the IQR, and the black dots indicate outliers.

Table S2. History of onchocerciasis control between 1975 and 2018 per region and prefecture in Togo

Region Prefecture (no. villages surveyed)	**OCP phase**	**SIZ**	**Aerial larviciding Vector Control (VC)**		**Ivermectin MDA**		**Observations**
			Start year	**End year**	**Start year**	**Biannual MDA and stop-MDA**	
Savanes (49)	II and III E	Mostly	1976 (7%) 1977 (93%)	1993	1993	Biannual MDA since 2003 in three prefectures Stop-MDA considered since 2018	Western parts of Tône, Tandjouaré and Oti prefectures were included in OCP Phase II In some prefectures, MDA might have started later, as control focused on VC VC ended either in 1993 or at the beginning of 1994. Evidence of ongoing transmission in 2022 (anti-Ov16 ELISA seroprevalence in children samples in Tône, Tandjouaré and Kpendjal above 0.1% threshold) [17]
Kpendjal, including Kpendjal-Ouest (9)[a]	III E	Mostly (90%)	1976 (22%) 1977 (78%)	1993	1993	Biannual MDA since 2003	Focal control on a hyperendemic focus until 2007 MDA may have started sooner (between 1988 and 1993)
Oti, including Oti-Sud (29)[a]	II (5%) III E (95%)	Yes	1977	1993	1993	Biannual MDA in 1993 and since 2003	–
Tandjoaré or Tandjouaré (5)	III E	Yes	1977, possibly 1976	1993	NA	Biannual MDA in 2004, 2005 and from 2007 to 2011	Tandjouaré was later included in the SIZ to participate in the biannual MDA
Tône, including Cinkassé (6)[a]	III E	No	1976 (25%) 1977 (75%)	1993	NA	No	Includes two villages with no follow-up surveys and a baseline endemicity similar to Samomoni village [5]

Table S2. Continued

Region Prefecture (no. villages surveyed)	**OCP phase**	**SIZ**	**Aerial larviciding Vector Control (VC)**		**Ivermectin MDA**		**Observations**
			Start year	**End year**	**Start year**	**Biannual MDA and stop-MDA**	
Kara (88)	III E	Yes	1977	1993/2002 /2007	1988 (75%) 1992 (5%) 1995 (20%)	Biannual MDA since 2003 in all prefectures	Most but possibly not all the river basins in Kara had VC until 2007 (potentially ending in 1993 and 2002). However, it was not possible to be precise, as each prefecture is under the influence of several water courses. Therefore, for modelling purposes, it was assumed that VC ended in 2007
Assoli (3)	III E	Yes	1977	1993/2002 /2007	1992	Biannual MDA since 2003	–
Bassar (17)	III E	Yes	1977	2002/2007	1988	Biannual MDA in 1992, 1995, 1998 and since 2003	Besides the prefecture interventions, VC was implemented at least in 1981-1988 in those river basins (Kassa River) where the Djodji form of *Simulium sanctipauli* (a highly competent vector of *O. volvulus*) had been found [18]
Binah or Bimah (4)	III E	No	1977	2002/2007	1992	Biannual MDA since 2003	–
Dankpen (19)	III E	Yes	1977	1993/2002 /2007	1995	Biannual MDA since 2003	–

Table S2. Continued

Region Prefecture (no. villages surveyed)	**OCP phase**	**SIZ**	**Aerial larviciding Vector Control (VC)**		**Ivermectin MDA**		**Observations**
			Start year	**End year**	**Start year**	**Biannual MDA and stop-MDA**	
Doufelgou (5)	III E	Yes	1977	1993/2002 /2007	1988	Biannual MDA in 1988, 1992 and since 2003	–
Kéran (13)	Mostly III E	Yes	1977	2002/2007	1988	Biannual MDA in 1996 and since 2003 Triannual MDA in 1993	–
Kozah (27)	III E	Yes	1977	2002/2007	1988	Biannual MDA in 1988, 1992, 1998 and since 2003	–
Centrale (86)	III E and SE	Partially	1977 (20%) 1988 (5%) 1989 (75%)	2002 (70%) 2007 (30%)	1991	Biannual MDA since 2003 in two prefectures	–
Blitta (28)	SE	No	1988 (4%) 1989 (96%)	2002	1991	No	Besides the prefecture interventions, VC was implemented at least in 1981-1988 in those river basins (Anié and Arukaukau Rivers) where the Djodji form of *Simulium sanctipauli* (a highly competent vector of *O. volvulus*) had been found [18]

Table S2. Continued

Region Prefecture (no. villages surveyed)	**OCP phase**	**SIZ**	**Aerial larviciding Vector Control (VC)**		**Ivermectin MDA**		**Observations**
			Start year	**End year**	**Start year**	**Biannual MDA and stop-MDA**	
Sotouboua, including Mô (34)[a]	III E (40%) SE (60%)	Partially (40%)	1977 (40%) 1988 (6%) 1989 (54%)	2002 (60%) 2007 (40%)	1991	Biannual MDA since 2003	Besides the prefecture interventions, VC was implemented at least in 1981-1988 in those river basins (Kpaza Koue, Anié and Arukaukau Rivers) where the Djodji form of *Simulium sanctipauli* (a highly competent vector of *O. volvulus*) had been found [18] Part of the rivers of this prefecture were included in the SIZ until 2007 (Mô River basin).
Tchamba (16)	SE	No	1989	2002	1991	No	–
Tchaoudjo or Tchaudjo (8)	III E (20%) SE (80%)	Partially (20%)	1977 (22%) 1988 (33%) 1989 (45%)	2002 (80%) 2007 20%)	1991	Biannual MDA since 2003	–
Plateaux (136)	SE	No	1976 (1%) 1988 (10%) 1989 (89%)	2002	1991 (55%) 1992 (30%) 1993 (5%)	Biannual MDA since 2014 in four prefectures	–
Agou (13)	SE	No	1988	2002	1991	No	–

Table S2. Continued

Region Prefecture (no. villages surveyed)	**OCP phase**	**SIZ**	**Aerial larviciding Vector Control (VC)**		**Ivermectin MDA**		**Observations**
			Start year	**End year**	**Start year**	**Biannual MDA and stop-MDA**	
Akébou, including areas previously from Wawa (2)[a]	SE	No	1989	NA	1993	No	–
Amou (8)	SE	No	1989	2002	1992	Biannual MDA since 2014	Besides the prefecture interventions, VC was implemented at least in 1981-1988 in those river basins (Anié River) where the Djodji form of *Simulium sanctipauli* (a highly competent vector of *O. volvulus*) had been found [18]
Anié, including areas previously from Ogou (12)[a]	SE	No	1989	2002	1991	Biannual MDA in 1993, 1995 and 1996	Besides the prefecture interventions, VC was implemented at least in 1981-1988 in those river basins (Anié River) where the Djodji form of *Simulium sanctipauli* (a highly competent vector of *O. volvulus*) had been found [18]
Danyi (5)	SE	No	1976 (25%) 1989 (75%)	2002	1993	Biannual MDA since 2014	Besides the prefecture interventions, VC was implemented at least in 1981-1988 in those river basins (Anié and Gban-Houa/Wawa Rivers) where the Djodji form of *Simulium sanctipauli* (a highly competent vector of *O. volvulus*) had been found [18]
Est-Mono (15)	SE	No	1989	2002	1991	No	–

Table S2. Continued

Region Prefecture (no. villages surveyed)	**OCP phase**	**SIZ**	**Aerial larviciding Vector Control (VC)**		**Ivermectin MDA**		**Observations**
			Start year	**End year**	**Start year**	**Biannual MDA and stop-MDA**	
Haho (21)	SE	No	1988 (38%) 1989 (62%)	2002	1992	Biannual MDA since 2014	–
Kloto, may include areas of Kpélé (5)	SE	No	1989	2002	1993	No	–
Kpélé, including areas previously from Kloto (2)[a]	SE	No	1988	2002	1993	No	–
Moyen-Mono (6)	SE	No	1989	2002	1992	Biannual MDA in 1993	–
Ogou, may include areas of Anié (37) [a]	SE	No	1989	2002	1991	Biannual MDA in 1992 and since 2014 Triannual MDA in 1993	Besides the prefecture interventions, VC was implemented at least in 1981-1988 in those river basins (Anié River) where the Djodji form of *Simulium sanctipauli* (a highly competent vector of *O. volvulus*) had been found [18]
Wawa, may include areas from Akébou (10)[a]	SE	No	1988 (13%) 1989 (87%)	2002	1991	No	Besides the prefecture interventions, VC was implemented at least in 1981-1988 in those river basins (Anié, Gban-Houa/Wawa, Domi and Ove Rivers) where the Djodji form of *Simulium sanctipauli* (a highly competent vector of *O. volvulus*) had been found [18,19]

Table S2. Continued

Region Prefecture (no. villages surveyed)	**OCP phase**	**SIZ**	**Aerial larviciding Vector Control (VC)**		**Ivermectin MDA**		**Observations**
			Start year	**End year**	**Start year**	**Biannual MDA and stop-MDA**	
Maritime (41)	SE	No	1988 (97%) 1989 (3%)	2002	1993	Some prefectures implemented stop-MDA surveys in 2014, 2018 or 2020.	–
Avé (5)	SE	No	1988	2002	1993	No Stop-MDA assessment successful in 2022 [20]	–
Bas-Mono, including areas previously from Lacs (2)[a]	SE	No	1988	2002	1993	Stop-MDA assessment (2014-2017) detected ongoing transmission. MDA was re-started in 2017 [20]. Stop-MDA assessment successful in 2022 [20]	–
Golfe, including Lomé and Agoè-Nyivé (0)[a]	SE	No	–	–	–	The stop-MDA assessment (2014-2017) completed in 2017 was successful [20]	Non-endemic for onchocerciasis; most of the prefecture did not need control. However, some focal foci had low prevalence at baseline (no updated information)
Lacs (0)	SE	No	1989	2002	1993	Started stop-MDA assessment in 2018, which was successful [20]	The historically known endemic part of Lacs was recently divided into Lacs and Bas-Mono. Only Bas-Mono is endemic

Table S2. Continued

Region Prefecture (no. villages surveyed)	**OCP phase**	**SIZ**	**Aerial larviciding Vector Control (VC)**		**Ivermectin MDA**		**Observations**
			Start year	**End year**	**Start year**	**Biannual MDA and stop-MDA**	
Vo (0)	SE	No	–	–	–	The stop-MDA assessment (2014-2017) completed in 2017 was successful [20]	Non-endemic for onchocerciasis by 2006
Yoto (22)	SE	No	1988	2002	1993	No Stop-MDA assessment detected ongoing transmission in 2022 [20]. Biannual MDA considered in 2023-2024.	–
Zio (12)	SE	No	1988 (100%)	2002	1993	No Stop-MDA assessment successful in 2022 [20]	–
All prefectures (400)							

OCP, Onchocerciasis Control Programme in West Africa; SIZ, Special Intervention Zones; VC. Vector control; MDA, Mass Drug Administration with ivermectin.

[a]Over the past 15 years, Togo has undergone administrative changes affecting its prefectures. In 2012, Tône was split into Tône and Cinkassé; Lacs was divided into Lacs and Bas-Mono (with the latter being historically known as the original onchocerciasis-endemic area of Lacs); Kloto was separated into Kloto and Kpélé; Ogou was divided into Ogou and Anié, and Wawa was divided into Wawa and Akébou. In 2018-19, Kpendjal was separated into Kpendjal-Ouest and Kpendjal; Oti was divided into Oti and Oti-Sud; Sotouboua was split into Sotouboua and Mô, and Lomé Capital comprised 5 prefectures.

Text S2. Data sources

Our study involved the integration of two national databases containing geographical, epidemiological and historical control information on VC and ivermectin MDA. The data were obtained from the OCP (EPICROSS) database, publicly available from Vinkeles Melchers et al. [15] and progress reports [21-24], SIZ reports, MoH of Togo reports, World Health Organization and Expanded Special Project for Elimination of Neglected Tropical Diseases (WHO-ESPEN), as well as from academic publications [13,25-30]. Data curation was conducted to address inconsistent formats and ensure compatibility of datasets prior to their analyses and modelling using R version 4.4.1 [31], and RStudio version 2024.04.2 [32], and Imperial College Research Computing Service [33].

Changes in Togo's prefecture organisation over time (see footnote of Table S2) were tracked for the modelling. Data were primarily utilised at the village level within prefectures. Initial ivermectin MDA records (1988-2018) were only available at the prefecture level. The distribution of surveyed villages is presented in Figure S5. The relationship between crude and age- and sex-standardised microfilarial prevalence is presented in Figure S6.

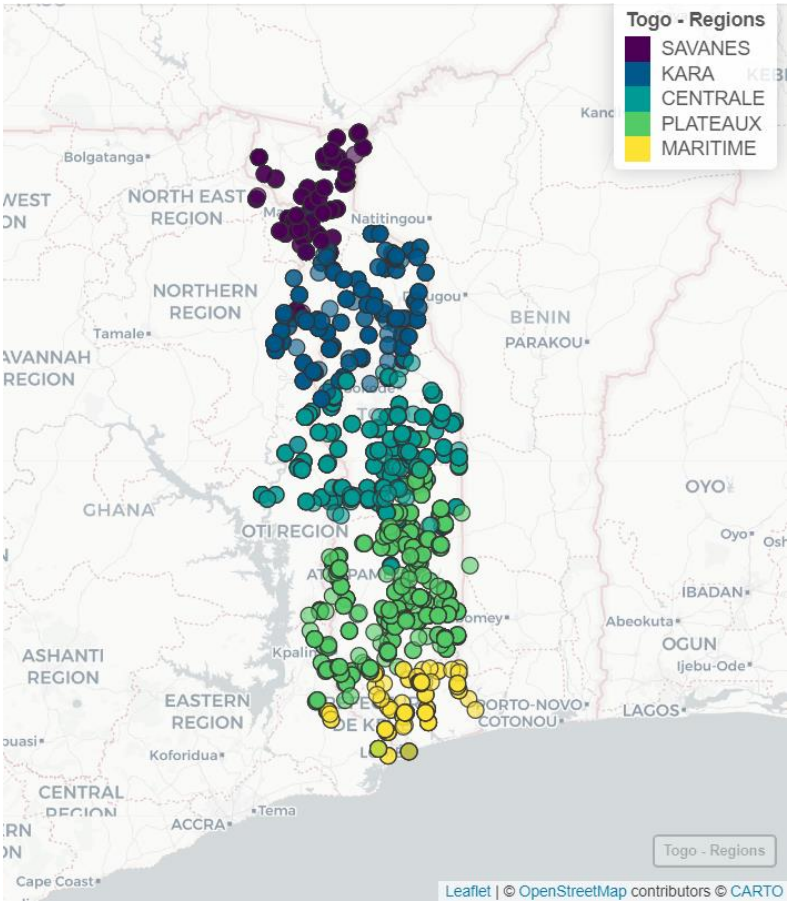

Figure S5. Geographical distribution of villages for onchocerciasis monitoring across regions in Togo. Village GPS coordinates show approximate locations.

Relationship between crude and age- and sex-standardised microfilarial prevalence

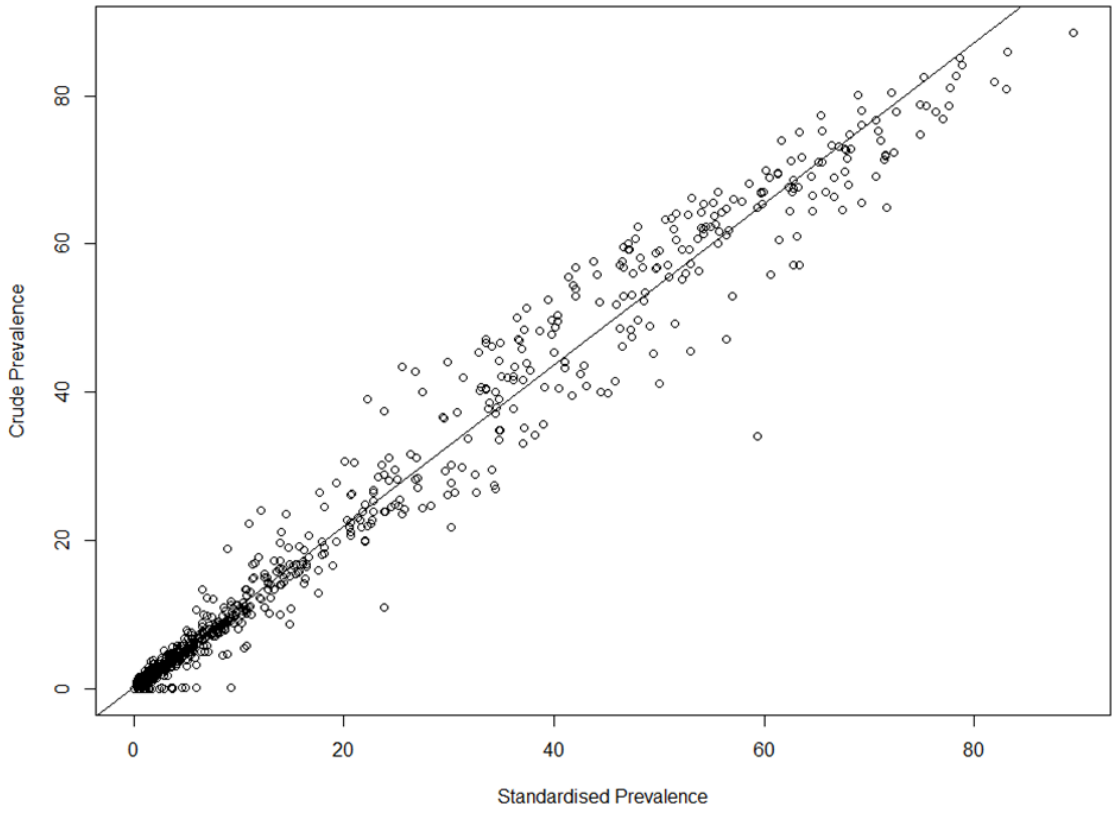

Figure S6. Linear relationship between crude microfilarial prevalence and age- and sex-standardised microfilarial prevalence (n = 1612 surveys). Pearson's correlation coefficient = 0.99, p-value <0.0001.

Text S3. Estimation of Annual Biting Rates (ABRs)

The EPIONCHO-IBM transmission model reproduces the strongly non-linear relationship that has been observed between microfilarial prevalence and annual biting rate (ABR, number of bites/person/year) at pre-intervention endemicity conditions [34,35]. Calculation of ABR values to capture each baseline microfilarial prevalence (hypo- to holoendemic) level is necessary for simulating onchocerciasis dynamics [36]. The determined ABR values are given in Table S3 assuming a value of $k_E = 0.3$ for the inter-individual exposure heterogeneity parameter and its associated parasite density-dependence parameters [36,37]. The high ABR values modelled that correspond to hyper- and holoendemicity are consistent with observed ABRs before the start of anti-vectorial interventions in Togo (Table S4). ABRs measured at vector capture points (typically close to vector breeding sites) are likely higher than those at the villages [34].

Table S3. Modelled annual biting rate (ABR) for each pre-control endemicity (microfilarial baseline prevalence) level

Modelled baseline microfilarial prevalence (BMP, %) (endemicity level)	**Modelled annual biting rate (ABR, bites/person/year)** (range)[a]
30 (hypoendemicity)	290 (240–450)
50 (mesoendemicity)	615 (430–1,054)
70 (hyperendemicity)	2,200 (1,210–6,320)
90 (holoendemicity)	60,000 (46,000–137,000)

[a]Range of annual biting rates (ABRs) sampled using the EPIONCHO-IBM model for hypoendemicity (30% BMP), mesoendemicity (50% BMP), hyperendemicity (70% BMP) [37], and holoendemicity (90% BMP).

Only the ABR values (not the ranges) were used in this work, but the ranges are included here to provide a better appreciation of the variability in ABR values associated with a given BMP.
NB: For 85% BMP, the mode (and range) of ABR values sampled using EPIONCHO-IBM is 22,000 (6,000–50,000) [38], illustrating that at the upper end of microfilarial prevalence, the relationship between ABR and BMP is very non-linear [36].

Table S4. Annual biting rates measured at vector capture points prior to vector control, and baseline microfilarial prevalence (BMP) in surveyed villages

River basin [Reference]	**Vector capture point**	**Baseline annual biting rate (ABR, bites/person/year) at vector capture point** (survey year)	**Age- and sex-standardised mean BMP in village (%)** (range)	**Surveyed villages** (survey year)
Kara/Oti [39,40]	Landa-Pozanda	27,951 (1976-77)	83 (NA)	Landa-Pozanda (1976)
	Sarakawa Kpelou	14,538 (1976-77)	65 (62 – 68)	Anima (1976); Leon (1976)
Kéran/Oti [39,40]	Naboulgou	17,364 (1976-77)	NA	Several villages without recorded BMP following hyper- to holoendemic trends
	Sola	7,379 (1976-77)	NA	A village without recorded BMP (Sola) following a holoendemic trend
	Tapoundé	9,128 (1976-77)	NA	Villages without recorded BMP following hypo- to hyperendemic trends
	Titira	28,266 (1976-77)	89 (NA)	Tchitchira/Titira (1976)
Kéran/Oti (Binah/Bimah) [39]	Pouda	13,945 (1977-77)	NA	Villages without recorded BMP following meso- to hyperendemic trends
Koumongou/Oti [39]	Korontiere and Kouporgon	7,255 (1977-77)	50.1 (NA)	Fare (1976). Villages without recorded BMP following hypo- to holoendemic trends
Mono [41,42]	Atchinedji	54,283 (1978–1981)	74 (64 – 83)	Adouroukopé/Assanté (1990); Oniakopé (1977)

Table S4. Continued

River basin [Reference]	**Vector capture point**	**Baseline annual biting rate (ABR, bites/person/year) at vector capture point** (survey year)	**Age- and sex-standardised mean BMP in village (%)** (range)	**Surveyed villages** (survey year)
Mono [41,42]	Kpessi	46,764 (1978–1981)	52 (38 – 65)	Alemondji (1990); Atotoie (1990); Babame (1990); Kodjodakopé (1990); Kokote (1989); Konta (1990); Maroukou II (1990); Tchankpa (1990); Yambakopé (1990)
	Landa Mono	39,894 (1978–1981)	59 (46 – 67)	Bodowda (1990); Boungolo (1989); Djomé (1977); Kaza (1990); Kassikide (1989); Kendjeria (1990); Laoude (1990); Landa-Mono (1989); Mono 1 (1989); Sessaro (1990); Souroutawi (1989)
	Tetetou/Tététou	106,325 (1978–1981)	62 (26 – 82)	Aglamassoe (1990); Diome (1977); Djikame (1990); Hoevime (1990); Kpodji (1989); Siyime (1989); Tetetou (1977)
Mono (Amou) [41,42]	Amou-Oblo	33,514 (1978–1981)	54 (11 – 73)	Abouloukopé (1989); Adjabouloukoukopé (1989); Afikopé (1989); Agote (1989); Amouta (1980); Aroukakopé (1989); Fedigbe/Fétigbé (1990); Safou-Kopé Atiba (1990); Wetrope (1989)
Mono (Anié) [41,42]	Fazao	24,675 (1978–1981)	52 (44 – 60)	Fazao (1977); N'Djavezi (1990)
	Pagala	13,795 (1978–1981)	58 (25 – 79)	Agodeka (1990); Anamanie (1990); Katakpe (1990); Kpawa (1990); Niama-Niama (1990); Tchanie (1990); Yoloum (1990)
	Alamassou/Alamansou	58,334 (1978–1981)	86 (NA)	Alamassou (1977)

Table S4. Continued

River basin [Reference]	**Vector capture point**	**Baseline annual biting rate (ABR, bites/person/year) at vector capture point** (survey year)	**Age- and sex-standardised mean BMP in village (%)** (range)	**Surveyed villages** (survey year)
Mô/Oti [29,40]	Bagan/Bangan/Banghan/ Baghan	46,983 (1976-77)	70 (68 – 72)	Bangan (1976); Mo-village (1975)
	Bouzalo/Mo	40,919 (1976-77)	73.5 (72 – 75)	Bouzalo (1975); Sagbadai (1980)
	Kéméni/Aleheride	22,557 (1976)	53 (NA)	Kemini/Kéméni (1976)
Mô/Oti (Aleheride/Boualé) [39]	Aleheride/Alèchéridé	28,342 (1976-77)	53.4 (NA)	Kemini
Mô/Oti (Kama) [39]	Pont Kama	16,174	65.4 (NA)	Bigabo (1976). Another village without recorded BMP (Saboundi) following a hyperendemic trend.
Ogou/Mono [41,42]	Sirka	16,486 (1978–1981)	41 (13 – 62)	Adibo (1990); Dote-Copé (1990); Efoufami-Yeye (1990); Flama (1990); Gbagbadjakou I (1990); Nangbeto-Asanté (1990); Tele-Kopé (1990)
Oti (Porga) [39]	Porga Pont	12,367 (1976-77)	53.4 (NA)	A village without recorded BMP (Sougtangou) following a hyperendemic trend.
Volta Lac [Gban-Houa] [41-43]	Djodji[a]	138,026 – 246,125 (1978–1981)	61 (44 – 78)	Azigo (1990); Dayes-Dodzi (1980)
Zio [34]	Tokpo, other villages	7,102 (1980)	85.1 (NA)	Tokpo (1980)

[a]The site of Djodji presented the highest transmission potentials (ATP = 2,157) [34,43] of the Eastern extension until the Djodji form of *Simulium sanctipauli* sensu stricto was eliminated as a result of larviciding [18].

Text S4. Minimal, reference and enhanced intervention scenarios

Three distinct levels of control interventions: “minimal”, “reference”, and “enhanced” were used in the simulations, based on variations in VC efficacy, MDA therapeutic coverage and the proportion of systematic non-adherence (SNA, representing the proportion of the population that never receives ivermectin). The MDA coverage increased over time. Initially, MDA was delivered by mobile teams with lower coverage until 1995 [9]. Subsequently, during the remaining period of the OCP, CDTI aimed for a minimum coverage of 65% of the total population (approximately 80% coverage of eligibles) to attain EPHP (1996-2001), followed by a target coverage of 80% of the total population (100% of eligibles) for EOT (2002 to date). Although the efficacy of VC has exceeded 90% in several OCP regions [44,45], certain areas exhibited lower efficacy, such as in the mountainous region of Oti [46] and Kara. Consequently, for the minimal and reference scenarios, VC efficacies of 60% and 75% were assumed, respectively. The proportion of SNA was set at 1% for the enhanced scenario, as SNA tends to decrease with higher therapeutic coverage [36,47,48]. For the minimal and reference scenarios, the proportion of SNA was assumed to be 5% and 2.5%, respectively [49].

Text S5. Proportion of the population surveyed over time

There was a statistically significant and negative linear relationship between the proportion of the population surveyed per village and the survey year. On average, the proportion of the village population surveyed per year decreased by 0.5% (95% confidence interval (CI) = 0.4%–0.6%; linear regression p-value <0.001). For instance, over 80% of the population was examined for skin microfilariae at the beginning of the OCP, which dropped to below 70% between 2006 and 2015 (Figure S7), a decade during which prevalence decreased, particularly between 2006 and 2010 (Figure S3). The reduction in the proportion of the population tested may denote a failure to test certain high-risk population groups absent at the time of examination (e.g., fishermen and gold prospectors [50], or an increased reluctance of the population to present at the parasitological examination by skin-snip microscopy [51], as this is a mildly invasive and painful procedure. In Plateaux, the proportion of the village populations examined (ranging between 60% and 90%) did not decrease over time.

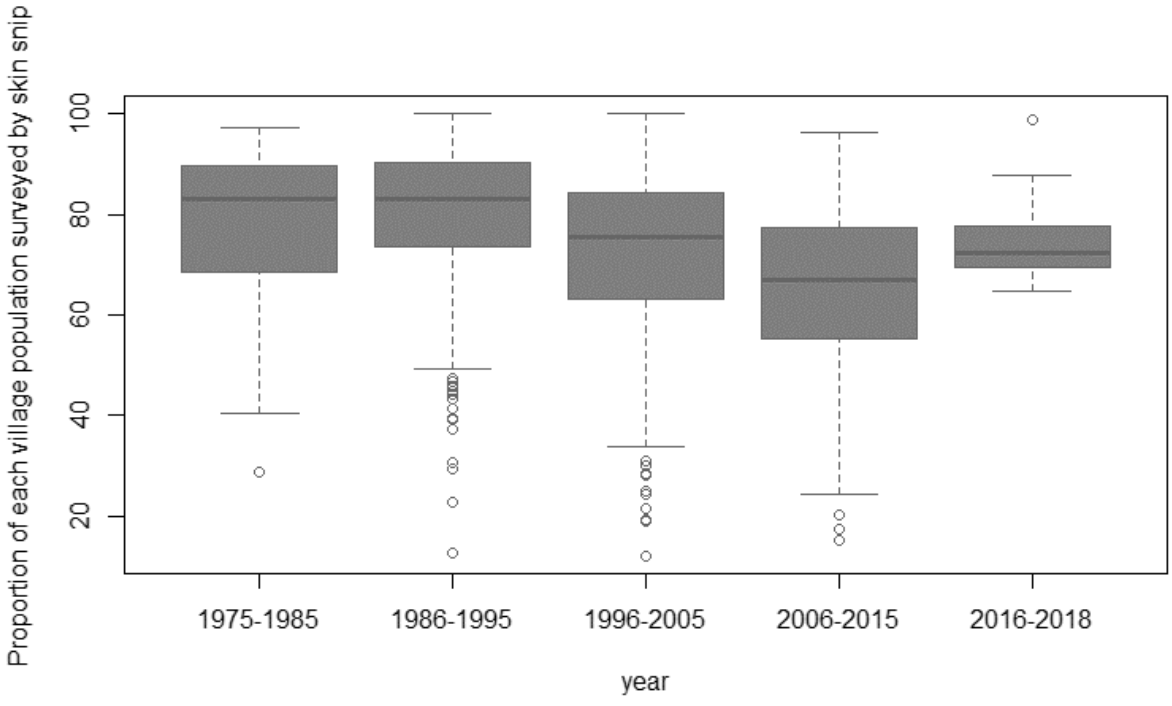

Figure S7. Box-and-whisker plots of the proportion of the population surveyed per village according to survey years. The horizontal lines within each box represent the median proportion, with the lower and upper box edges indicating the 25th and 75th percentiles, respectively (interquartile range, IQR). Whiskers extend to 1.5 times the IQR, and the white dots indicate outliers.

Text S6. Modelling for policy: PRIME-NTD

We adhered to the Five Principles of the Neglected Tropical Disease (NTD) Modelling Consortium for good practice in policy-relevant NTD modelling [52]. Table S5 briefly describes the five tenets, how they were fulfilled and where in the Main Text and/or Supplementary Material 1 and 2 files they can be found.

Table S5. Policy-Relevant Items for Reporting Models in Epidemiology of Neglected Tropical Diseases (PRIME-NTD) summary table

Principle	What has been done to satisfy the principle?	Where in the manuscript is this described?
Stakeholder engagement	Discussions with a range of modelling and policy-focused collaborators, including local stakeholders in Togo	Author list. Acknowledgements section
Complete model documentation	References to the full description of EPIONCHO-IBM provided. Link to EPIONCHO-IBM full code given	Methods section: EPIONCHO-IBM. Supplementary Material 1: Text S3. Data accessibility section in Notes at the end of Main Text
Complete description of data used	The data used have been published [15] and are described in the Main Text and the Supplementary Material 1 and 2, which complement the published database, with cited references	Methods section: Prevalence data. Supplementary Material 1. Reference lists of Main Text and Supplementary Material 1 and 2
Communicating uncertainty	Sensitivity and uncertainty analyses performed by simulating a range of parameters (e.g., coverage of ivermectin mass drug administration (MDA) (50-80% of total population); vector control efficacy (60-100%); proportion of systematic non-adherence (SNA, 1-5%), across four baseline microfilarial prevalence endemicity settings (hypoendemic, 30%; mesoendemic, 50%; hyperendemic, 70% and holoendemic, 90%) and three intervention scenarios (minimal, reference and enhanced	Methods sections: Modelling interventions and scenarios; Elimination probabilities. Tables in Main Text and Supplementary Material 1 and 2. Results section: Prevalence trends by region; Elimination probabilities. Figures 2-6 of Main Text and Figures S8-S14 of Supplementary Material 1.

	(to provide upper and lower bounds for model outputs on microfilarial prevalence temporal trends across regions). One hundred model runs conducted for each endemicity setting and intervention scenario. Ninety-five percent confidence intervals (or ranges, or interquartile ranges) calculated and presented for data	Supplementary Material 1 Tables
Testable model outcomes	Dynamics of microfilarial prevalence until 2030 modelled under historical and current interventions, showing model outputs together with village survey data to visualise agreement between modelling results and data (for nearly 400 villages and >1600 surveys, conducted between 1975 and 2017). Projected probabilities of reaching elimination of onchocerciasis transmission when simulating that MDA stops in 2024, 2027 or 2030. These probabilities can be compared with observations as stop-MDA surveys have been/are being conducted by the Ministère de la Santé et de l'Hygiène Publique of Togo	Results and Discussion sections of Main Text: Figures 2-7. Tables and Figures in Supplementary Material 1 and 2

Villages with recorded baseline microfilarial prevalence estimates in the OCP database

Table S6. Villages with recorded baseline microfilarial prevalence (BMP) estimates of *Onchocerca volvulus* by region, endemicity level and special intervention zone (SIZ) status in Togo. The model outputs and temporal infection trends of these villages are presented in Figures 2-6 of the Main Text

Baseline endemicity level (Microfilarial prevalence)	**Region and Figure**						
	Savanes Prefectures (*Villages*)[a] **Figure 2**		**Kara** Prefectures (*Villages*)[a] **Figure 3**	**Centrale** Prefectures (*Villages*)[a] **Figure 4**		**Plateaux** Prefectures (*Villages*)[a] **Figure 5**	**Maritime** Prefectures (*Villages*)[a] **Figure 6**
	SIZ	**non-SIZ**	**SIZ**	**SIZ**	**non-SIZ**	**non-SIZ**	**non-SIZ**
Hypoendemic (<40%)	**1:** Oti (*Fare*)	–	**2:** Assoli (*Soreda*), and Dankpen (*Natchitipi*)	–	**13:** Blitta (*Anamanie*, *Babame, Koulan-Centre, Lalamila, Nikingbe, Yambakopé, Yoloum*), Sotouboua (*Katchanke, Kaza, Ketcheboua*), Tchamba (*Assoula, Atafa II*), and Tchaoudjo (*Tchalanide*)	**16:** Agou (*Aglago-Kopé*), Akébou (*Azigo*), Anié (*Gbagbadjakou I, Tele-Kopé*), Est-Mono (*Efoufami-Yeye, Fassow, Gbomedji, Ogou-Allah*), Haho (*Alati-Pani & Medje*, *Kpodji-Kopé, Tcharome-Kopé*), Kloto (*Agote, Kouma-Kunda*), Moyen-Mono (*Djikame*), Ogou (*Dote-Copé*), and Wawa (*Eketo-Elavanyo*)	**6:** Avé (*Nyitakpo*), Yoto (*Akladjenou, Esse-Nadje*), and Zio (*Avedje, Dafolenyame, Kpetoe*)
Mesoendemic (40–59.9%)	**3:** Kpendjal (*Borgou*), and Oti (*Mogou, Panga*)	**1:** Tône (*Wokambo*)	**2:** Assoli (*Kemini/ Kemeni*), and Bassar (*Bigabo*)	–	**26:** Blitta (*Didjaré-Edjaré Kopé/Katakpui Kopé, Katakpé, Soussoukparovi, Tchanie, Toumoulmou*), Sotouboua (*Bodowda, Boungolo, Kassikide, Kedjebi-Lohou, Kpendjeria, Landa-Mono, Laoude/Somieda-Laoude, N'Djavezi/Fazao, Sessaro, Tigbada*), Tchamba (*Agoumana, Alibi 1, Djomé, Goubi, Hezoude, Mono 1, Samayi, Souroutawi*), and Tchaoudjo (*Aou-Losso, Koboyo, Salaou*)	**27:** Amou (*Ogomé Yabui*), Anié (*Flama, Kabre-Kopé, Niampopo*), Danyi (*Amouta, Wetropé, Zoubega Ouga*), Est-Mono (*Adibo, Alemondji, Atotoie, Kodjodakopé, Konta, Maroukou II, Tchankpa*), Haho (*Djemigni, Hoevime, Siyime*), Kpélé (*Kpélé-Guebakui*), Moyen-Mono (*Aglamassoe/Tététou, Pativeme*), Ogou (*Abuloukopé, Adjabouloukoukopé, Adouroukopé/Assante, Afikopé, Nangbeto-Asante*), and Wawa (*Kemedisso, Obe/Pyacope (Obetodji)*)	–

Table S6. Continued

Baseline endemicity level (Microfilarial prevalence)	Region and Figure						
	Savanes Prefectures (*Villages*)[a] **Figure 2**		**Kara** Prefectures (*Villages*)[a] **Figure 3**	**Centrale** Prefectures (*Villages*)[a] **Figure 4**		**Plateaux** Prefectures (*Villages*)[a] **Figure 5**	**Maritime** Prefectures (*Villages*)[a] **Figure 6**
	SIZ	**non-SIZ**	**SIZ**	**SIZ**	**non-SIZ**	**non-SIZ**	**non-SIZ**
Hyperendemic (60–79.9%)	–	**2:** Kpendjal (*Koundjouaré*)and Tône (*Samomoni*)	**6:** Bassar (*Bangan, Mo-village*), Doufelgou (*Anima, Leon*), and Kozah (*Kpesside, Landa-Pozanda*)	**2:** Tchaoudjo (*Bouzalo, Sagbadai*)	**5:** Blitta (*Abossoumkopé, Agodeka, Gnama-Gnama, Kpawa, Niama-Niama*)	**25:** Agou (*Tokpo*), Akébou (*Anani*/*Dogokopé*), Amou (*Gnamassilé*), Anié (*Kamalo-Kopé, Konigbo*), Est-Mono (*Alabade Atsoude, Aroukakopé, Kokote, Oniakopé*), Haho (*Kokpli, Kpodji, Tetetou*), Moyen-Mono (*Diome, Gama-Ekeme, Game-Togbuihoe*), Ogou (*Alamassou, Ateoue, Atome, Fedigbe/Fétigbé, Illougba, Kpogandji, Otsanani-Adedakopé, Safou-Kopé Atiba, Tchagri*), and Wawa (*Dayes-Dodzji/Kessibo-Dzodzi/Dayi Dodji*)	**1:** Yoto (*Yoto-Kopé*)
Holoendemic (≥80%)	–	–	**2:** Kéran (*Titira, Tchitchira*)	–	–	–	–
Total	**4**	**3**	**12**	**2**	**44**	**68**	**7**

[a]Number (in bold) and name (in italics) of villages.

Text S7. Modelled infection trends by region and Special Intervention Zone (SIZ) status for villages without recorded baseline microfilarial prevalence estimates of *Onchocerca volvulus* in Togo

The results presented here are based on trend analysis. Baseline microfilarial prevalence (BMP) estimates for these villages were not recorded.

Savanes SIZ prefectures: Oti, Kpendjal and Tandjouaré

These villages were captured by hypo- to hyperendemic prevalence trends (Figure S8). Hyperendemic prevalence trends were observed along the Oti River Basin. Probabilities of EOT for these villages are presented in Supplementary Material 2, Table S7.

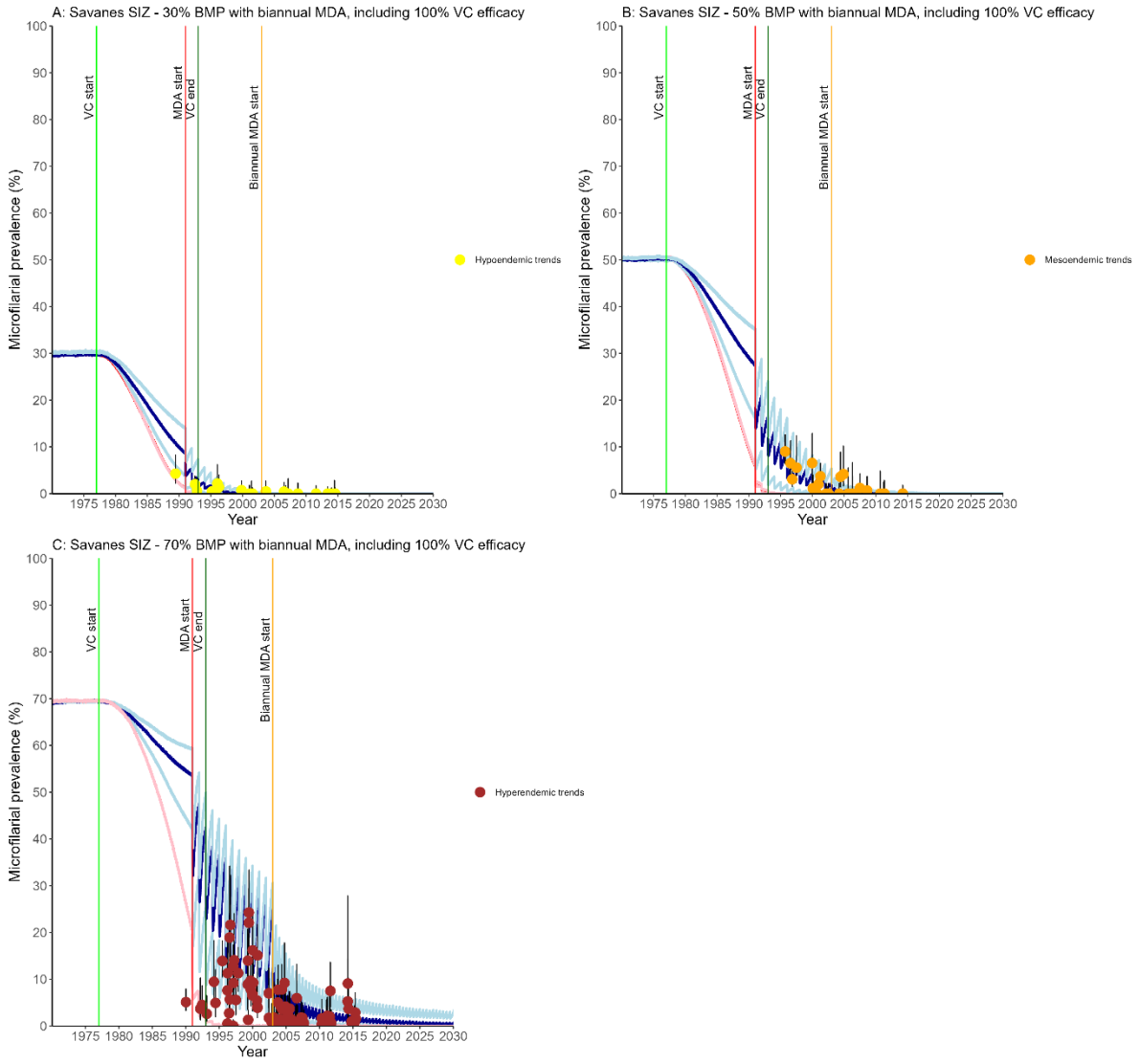

Figure S8. *Onchocerca volvulus* microfilarial prevalence trends simulated using EPIONCHO-IBM (until 2030) and survey data for villages without recorded baseline microfilarial prevalence (BMP) estimates for Savanes Region within the Special Intervention Zone (SIZ), with vector control (VC) and ivermectin mass drug

administration (MDA). *A*, villages (*n*=9) following hypoendemic prevalence trends with 30% BMP and VC efficacy as in Table 2 of Main Text (blue lines) or 100% VC efficacy (red lines). *B*, villages (*n*=5) following mesoendemic prevalence trends with 50% BMP and VC efficacy as in Table 2 of Main Text (blue lines) or 100% VC efficacy (red lines). *C*, villages (*n*=21) following hyperendemic prevalence trends with 70% BMP and VC efficacy as in Table 2 of Main Text (blue lines) or 100% VC efficacy (red lines). The village survey data are represented by coloured circles and the error bars are the 95% (Wilson score) confidence intervals (95%CIs). Yellow circles correspond to prefectures (*villages*) following hypoendemic trends in *A*: Oti (*Fareo, Gbemba-Bas, Gnangbandi, Legbando, Nagbakou, N'Kpe II, Sadori, Toutionga*), and Tandjouaré (*Dimongue*). Orange circles denote prefectures (*villages*) following mesoendemic trends in *B*: Oti (*Kpinkparpak, Mantche, Nalogbandi, Tchitchilinga, Togou*). Brown circles indicate prefectures (*villages*) following hyperendemic trends in *C*: Kpendjal (*Kpintidjouaga, Moukaga, Natoundjenga, Natounkpargou, Nassiele, Pancerys, Sougtangou*), Oti (*Bonsougou, Boutchakou, Djandjatie, Kpatibori, Koukoumbou, Koulagniere, Naboli, Nambossi, Poporkou, Simbo, Tchountchonga, Tchri, Yiyingou*), and Tandjouaré (*Lokpano*). For each BMP setting and intervention scenario, the average of 100 model repeats was used to calculate the mean microfilarial prevalence dynamics (blue or red lines). Dark blue/red lines represent the reference scenario; light blue/red lines above and below dark blue/red lines indicate the minimal and enhanced scenarios, respectively. Vertical coloured lines indicate: start of VC (light green); start of annual MDA (red); end of VC (dark green); start of biannual MDA (orange).

Savanes non-SIZ prefectures: Tône

These villages followed hypoendemic prevalence trends (Figure S9). Probabilities of EOT for these villages are presented in Supplementary Material 2, Table S7.

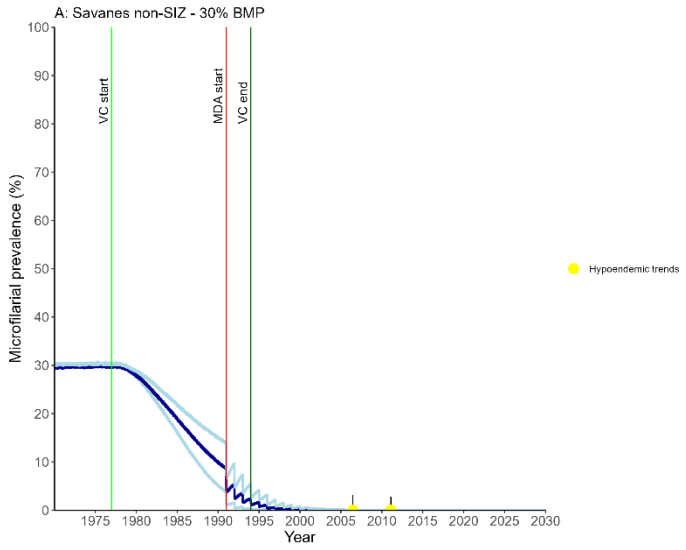

Figure S9. *Onchocerca volvulus* microfilarial prevalence trends simulated using EPIONCHO-IBM (until 2030) and survey data for villages without recorded baseline microfilarial prevalence (BMP) estimates for Savanes Region outside the Special Intervention Zone (SIZ), with vector control (VC) and annual ivermectin mass drug administration (MDA). *A*, villages (*n*=2) following hypoendemic prevalence trends with 30% BMP. The village survey data are represented by coloured circles and the error bars are the 95% (Wilson score) confidence intervals (95%CIs). Yellow circles correspond to prefectures (*villages*) following hypoendemic trends: Tône (*Lougou, Tinnogo*). For each BMP setting and intervention scenario, the average of 100 model repeats was used to calculate the mean microfilarial prevalence dynamics (blue lines). Dark blue lines represent the reference scenario; light blue lines above and below dark blue lines indicate the minimal and enhanced scenarios, respectively. Vertical coloured lines indicate: start of VC (light green); start of annual MDA (red); end of VC (dark green); start of biannual MDA (orange).

Kara SIZ: All prefectures

Approximately half (32 out of 75) of the villages followed hyper- to holoendemic prevalence trends (Figure S10). In the Oti and Mô River Basins, a few villages (two in Oti and five in Mô) exhibited patterns suggesting hyperendemic trends with "reference" and "minimal" interventions, which could hamper their achievement of EOT. Similarly, in the Kara and Kéran River Basins, several villages displayed trends indicative of hyperendemic prevalence (five in Kara and four in Kéran), following the "reference" and "minimal" intervention scenarios, or holoendemic prevalence (five in Kara and eight in Kéran), which could hinder their progress towards EOT. Probabilities of EOT for these villages are presented in Supplementary Material 2, Table S8.

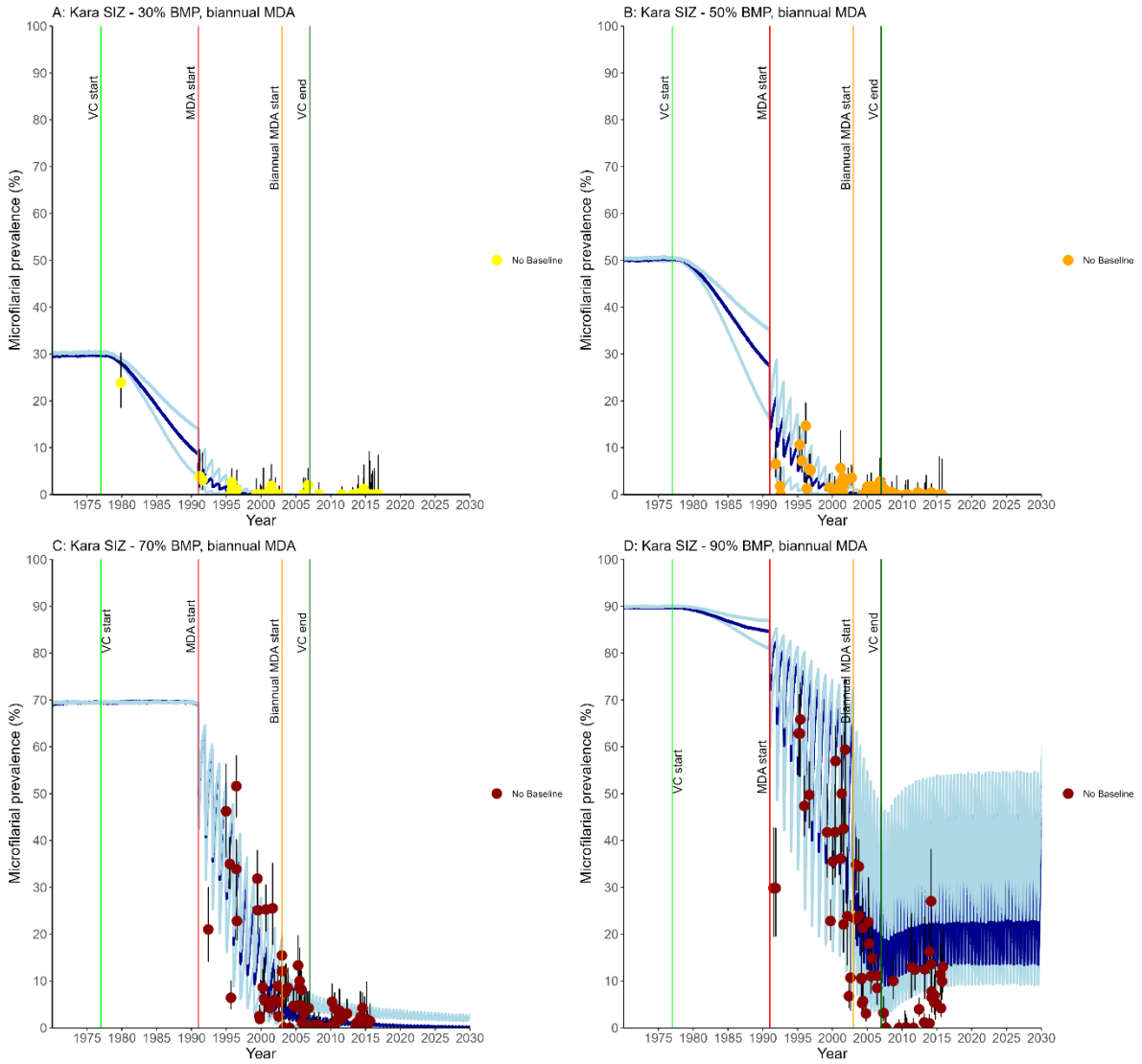

Figure S10. *Onchocerca volvulus* microfilarial prevalence trends simulated using EPIONCHO-IBM (until 2030) and survey data for villages without recorded baseline microfilarial prevalence (BMP) estimates for Kara

Region within the Special Intervention Zone (SIZ), with vector control (VC) and ivermectin mass drug administration (MDA). *A*, villages (*n*=25) following hypoendemic prevalence trends with 30% BMP; *B*, villages (*n*=17) following mesoendemic prevalence trends with 50% BMP; *C*, villages (*n*=18) following hyperendemic prevalence trends with 70% BMP; *D*, villages (*n*=13) following holoendemic prevalence trends with 90% BMP. The village survey data are represented by coloured circles and the error bars are the 95% (Wilson score) confidence intervals (95%CIs). Yellow circles correspond to prefectures (*villages*) following hypoendemic trends in *A*: Assoli (*Ouro-Gaode (Dako)*), Bassar (*Baoulinse, Bawlesi, Bougabou, Boulare*), Dankpen (*Kandjo, Kounkoumboule, Kpetab, Langa, Nandoungbale, Pesside-Ancien*), and Kozah (*Adeteyo, Agbang 2, Agbansoda, Kawa Bassar II, Koudjoukada, Kpagbazibiyo, Kpelouwai, Leziyo, Piyade, Poyo, Tchaloude, Tcholokoude, Toumboua, Toundounon*). Orange circles denote prefectures (*villages*) following mesoendemic trends in *B*: Bassar (*Kassou, Tchaboua*), Binah (*Agbarada*), Dankpen (*Bowindo, Karbongou, Konfouh & Diab, Oti-village & Bidjab, Tchirkpeni (Katchamba), Tchitchikpola*), Doufelgou (*Hounde*), and Kozah (*Abouda, Bounoh, Halalomou (Filandi), Kassi (Landa), Kawa, Kpangbassibiyo, Powai*). Brown circles indicate prefectures (*villages*) following hyperendemic trends in *C*: Bassar (*Dandjessi, Katcha-Konkomba, Kawa-Bassar, Kissafo, Madjatom, Saboundi*), Dankpen (*Kadjol II, Possao, Sakpone, Sekou-Bas*), Doufelgou (*Koulwere, Kpabte*), Kéran (*Hourta, Koutantagou / Koutantagou & Tapount, Wartema*), and Kozah (*Djamde Kawa, Weloude (Kpayabow), Zone Maraichere*), or those captured by holoendemic trends in *D*: Bassar (*Tchakassou, Wassi*), Dankpen (*Sikan, Touguel*), Kéran (*Goulbi, Koffi-Ferme, Koutougou Solla, Kpantiiyagou, Narita/Pesside, Pesside Ferme & Wassite/Wassite, Sola, Tchitchira Ferme*), and Kozah (*Aho-Lao*). For each BMP setting and intervention scenario, the average of 100 model repeats was used to calculate the mean microfilarial prevalence dynamics (blue lines). Dark blue lines represent the reference scenario; light blue lines above and below dark blue lines indicate the minimal and enhanced scenarios, respectively. Vertical coloured lines indicate: start of VC (light green); start of annual MDA (red); start of biannual MDA (orange); end of VC (dark green).

Centrale SIZ prefectures: Sotouboua (including Mô)

Nearly all villages (13/14) exhibited hyper- to holoendemic trends (Mô River Basin); one village followed hypoendemic prevalence trends (Figure S11). Probabilities of EOT for these villages are presented in Supplementary Material 2, Table S9.

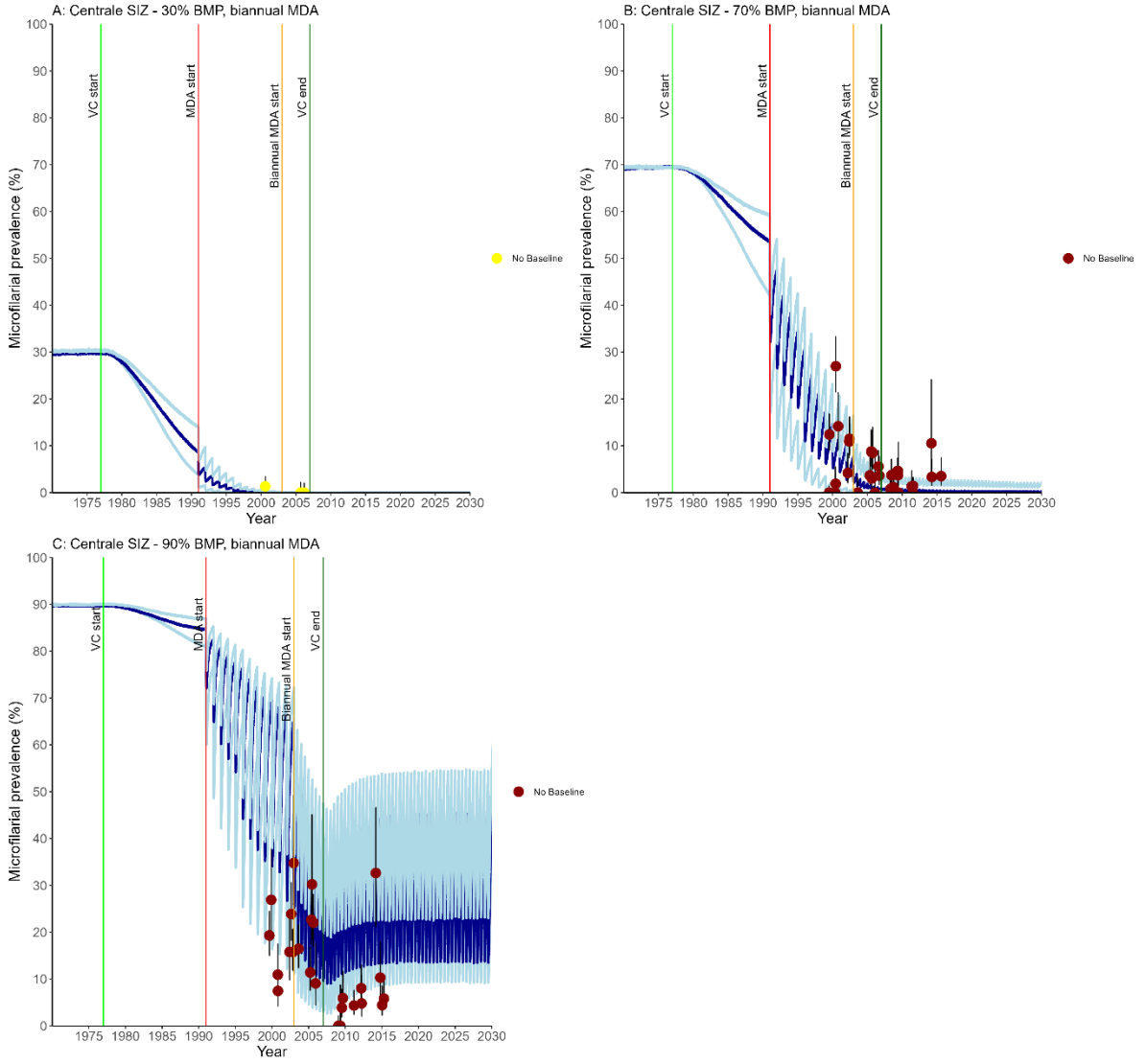

Figure S11. *Onchocerca volvulus* microfilarial prevalence trends simulated using EPIONCHO-IBM (until 2030) and survey data for villages without recorded baseline microfilarial prevalence (BMP) estimates for Centrale Region within the Special Intervention Zone (SIZ), with vector control (VC) and ivermectin mass drug administration (MDA). *A*, village (*n*=1) following hypoendemic prevalence trends with 30% BMP; *B*, villages (*n*=7) following hyperendemic prevalence trends with 70% BMP; *C*, villages (*n*=6) following holoendemic prevalence trends with 90% BMP. The village survey data are represented by coloured circles and the error bars are the 95% (Wilson score) confidence intervals (95%CIs). Yellow circles correspond to prefectures (*villages*) following hypoendemic trends in *A*: Sotouboua (*Gnezime*). Brown circles indicate prefectures (*villages*) following hyperendemic trends in *B*: Sotouboua (*Agbamassoumou, Dantchessi, Moussoukoudjou, Naboun-Koura, Tchatou Koura, Tchetchekou, Tchidao*), or those captured by holoendemic trends in *C*: Sotouboua (*Assawoh-Koura, Banda, Batto, Koida, Sakpagninga, Tchakpissi*). For each BMP setting and intervention scenario, the average of 100 model repeats was used to calculate the mean microfilarial prevalence dynamics (blue lines). Dark blue lines represent the reference scenario; light blue lines above and below dark blue lines indicate the minimal and enhanced scenarios, respectively. Vertical coloured lines indicate: start of VC (light green); start of annual MDA (red); start of biannual MDA (orange); end of VC (dark green).

Centrale non-SIZ prefectures: Blitta, Sotouboua, Tchaoudjo and Tchamba

The villages in these prefectures, predominantly under annual MDA, followed hypo- to hyperendemic prevalence trends (Figure S12). Probabilities of EOT for these villages are presented in Supplementary Material 2, Table S9.

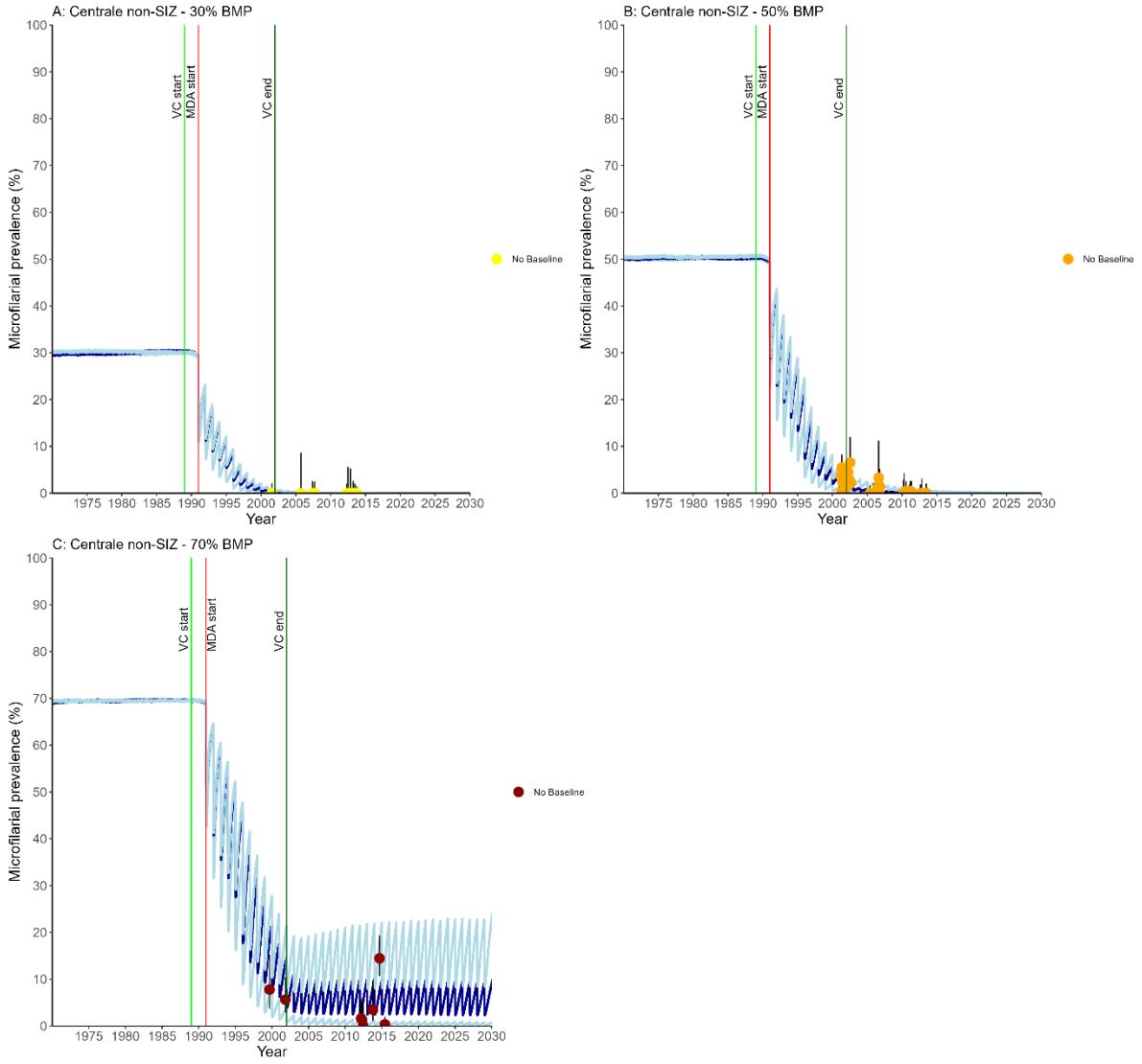

Figure S12. *Onchocerca volvulus* microfilarial prevalence trends simulated using EPIONCHO-IBM (until 2030) and survey data for villages without recorded baseline microfilarial prevalence (BMP) estimates for Centrale Region outside the Special Intervention Zone (SIZ), with vector control (VC) and annual ivermectin mass drug administration (MDA). *A*, villages (*n*=8) following hypoendemic trends with 30% BMP; *B*, villages (*n*=13) following mesoendemic trends with 50% BMP; *C*, villages (*n*=5) following hyperendemic trends with 70% BMP. The village survey data are represented by coloured circles and the error bars are the 95% (Wilson score) confidence intervals (95%CIs). Yellow circles correspond to prefectures (*villages*) following hypoendemic trends in *A*: Blitta (*Dikpéléou/Djaoulla, Kpakparassou & Ngobo, Motchokpli, N'Kengbe, Yourourou*), Sotouboua (*Lama Were-Laouda*), and Tchaoudjo (*Baleride, Tchemberi*). Orange circles denote prefectures (*villages*) following mesoendemic trends in *B*: Blitta (*Atchave, Okou-Kope, Pagala-Bouziya, Yovo-Kopé*), Sotouboua (*Kpamboure,*

Kpeida, Panlao, Sada-Mono), and Tchamba (*Akawolo, Blou-Elavagnon, Oudjomboi, Soukounde, Talaba*). Brown circles indicate prefectures (*villages*) following hyperendemic trends in *C*: Blitta (*Agbandi-Mono, Yeloum Bagnan*), Sotouboua (*Katchalikadi, Takade*), and Tchamba (Ogouda & Sombo). For each BMP setting and intervention scenario, the average of 100 model repeats was used to calculate the mean microfilarial prevalence dynamics (blue lines). Dark blue lines represent the reference scenario; light blue lines above and below dark blue lines indicate the minimal and enhanced scenarios, respectively. Vertical coloured lines indicate: start of VC (light green); start of annual MDA (red); end of VC (dark green).

Plateaux non-SIZ: All prefectures

These villages followed hypo- to hyperendemic prevalence trends. Villages in the Agou, Akébou, Anié, Est-Mono, Kloto, Kpélé, Moyen-Mono and Wawa Prefectures received annual MDA, while those in Amou, Danyi, Haho and Ogou Prefectures switched to biannual MDA since 2014 (Figure S13). Probabilities of EOT for these villages are presented in Supplementary Material 2, Table S10.

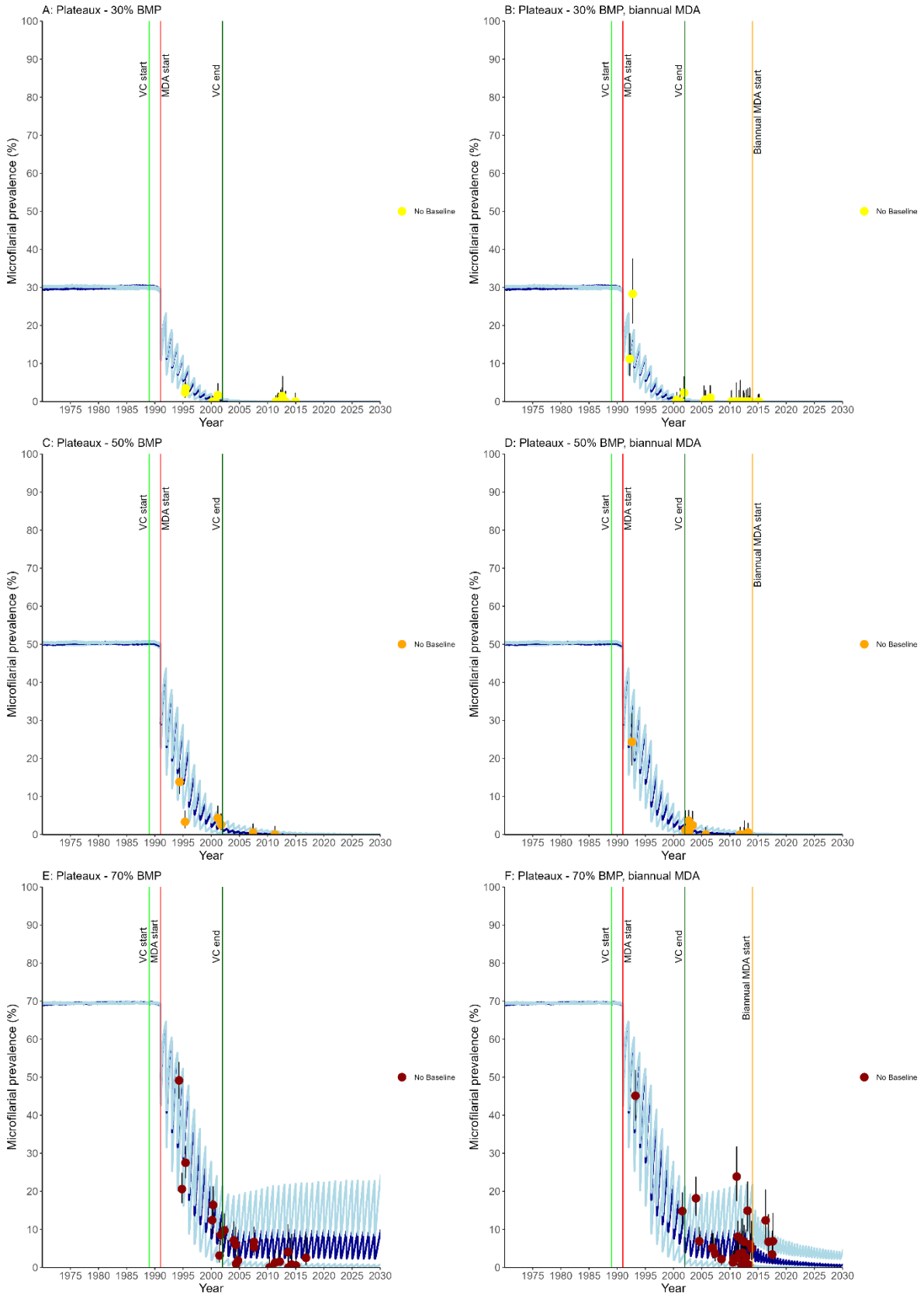

Figure S13. *Onchocerca volvulus* microfilarial prevalence trends simulated using EPIONCHO-IBM (until 2030) and survey data for villages without recorded baseline microfilarial prevalence (BMP) estimates for Plateaux Region, not included in the Special Intervention Zone (SIZ), with vector control (VC) and ivermectin mass drug

administration (MDA). *A*, villages (*n*=14) following hypoendemic prevalence trends with 30% BMP and annual MDA; *B*, villages (*n*=16) following hypoendemic prevalence trends with 30% BMP and biannual MDA since 2014; *C*, villages (*n*=3) following mesoendemic trends with 50% BMP and annual MDA; *D*, villages (*n*=9) following mesoendemic trends with 50% BMP and biannual MDA since 2014; *E*, villages (*n*=9) following hyperendemic trends with 70% BMP and annual MDA; *F*, villages (*n*=17) following hyperendemic trends with 70% BMP and biannual MDA since 2014. The village survey data are represented by coloured circles and the error bars are the 95% (Wilson score) confidence intervals (95%CIs). Yellow circles correspond to prefectures (*villages*) following hypoendemic trends in *A* (annual MDA): Agou (*Agokplame, Agoudouvou, Bloudokopé, Develebe, Kpovenou, Letsoukopé, Woglokopé, Zionou*), Anié (*Alé Kopé, Gavo Kossi, Mangotigomé, Toyigbo*), and Wawa (Nougbessou Kopé, Zogbegan-Oga), or *B* (switched to biannual MDA in 2014): Amou (*Kpélé Kopé*), Haho (*Anyam-Kopé/Agnam-Copé, Gotha Adja, Gotha Kabye, Hahonou, Kome, Medze*), and Ogou (*Agborou Kopé, Akpaka, Assante, Bagaou, Ebafei-Kopé, Grokopé, Haoussa Kpédji, Kpédji, Kpété Mava*). Orange circles denote prefectures (*villages*) following mesoendemic trends in *C* (annual MDA): Agou (*Koumasse, Tome*), and Wawa (*Ahlon Dzindzi*), or *D* (switched to biannual MDA in 2014): Haho (*Amouzoukopé (Djemeni), Atalakpota, Djakpo, Houno-Kopé, Fawukpe*), and Ogou (*Amou Akpekpe, Mayaba-Kopé, Otchanari, Tchékélé*). Brown circles indicate prefectures (*villages*) following hyperendemic trends in *E* (annual MDA): Agou (*Ananivikodzi*), Anié (*Atewe-Zongo*), Kloto (*Klo-Mayondi, Kpime-Seva, Nyive*), Kpélé (*Tutu Zionou*), and Wawa (*Guin Kopé, Odomi Abra, Sukul-Kpodji*), or *F* (switched to biannual MDA in 2014): Amou (*Glelou & Omouva, Igbowou-Amou, Kpati Copé, Pidina, Tsokple*), Danyi (*Denou Bumuebi, S. Outouala*), Haho (*Amouto*), and Ogou (*Amoutchou, Atinkpassa, Glive, Hetre, Ilekohan, Moba Kopé, Tanago, Tchékélé, Toigbo*). For each BMP setting and intervention scenario, the average of 100 model repeats was used to calculate the mean microfilarial prevalence dynamics (blue lines). Dark blue lines represent the reference scenario; light blue lines above and below dark blue lines indicate the minimal and enhanced scenarios, respectively. Vertical coloured lines indicate: start of VC (light green); start of annual MDA (red); end of VC (dark green); start of biannual MDA (orange).

Maritime non-SIZ: All prefectures

Villages generally exhibited low endemicity, except in Yoto and possibly Avé prefectures, where some trends suggested hyperendemic levels under the enhanced intervention scenario (Fig. S14). Probabilities of EOT for these villages are presented in Supplementary Material 2, Tables S11-S12.

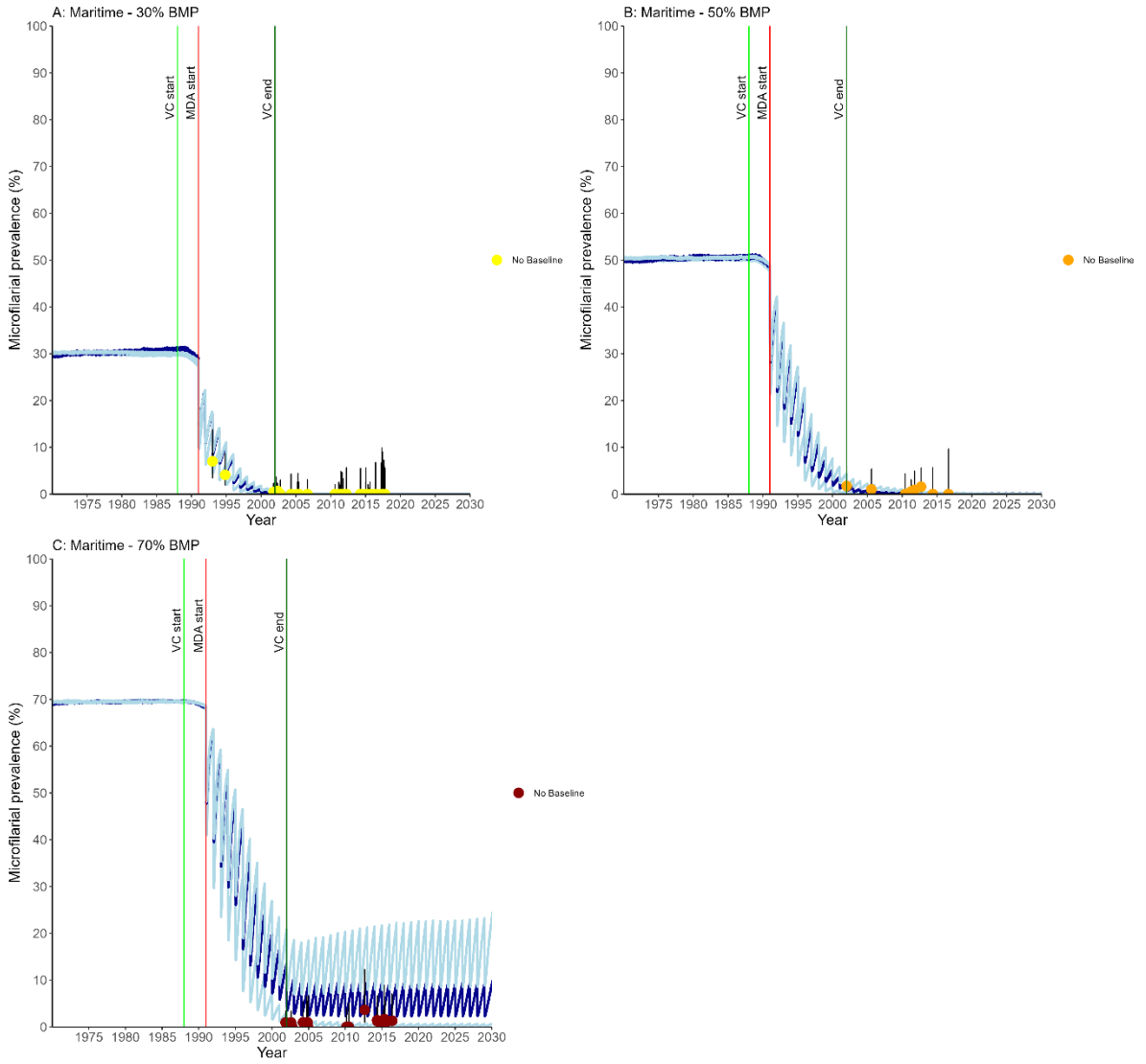

Figure S14. *Onchocerca volvulus* microfilarial prevalence trends simulated using EPIONCHO-IBM (until 2030) and survey data for villages without recorded baseline microfilarial prevalence (BMP) estimates for Maritime Region, not included in the Special Intervention Zone (SIZ), with vector control (VC) and annual ivermectin mass drug administration (MDA). *A*, villages (*n*=23) following hypoendemic prevalence trends with 30% BMP; *B*, villages (*n*=3) following mesoendemic trends with 50% BMP; *C*, villages (*n*=8) following hyperendemic trends with 70% BMP. The village survey data are represented by coloured circles and the error bars are the 95% (Wilson score) confidence intervals (95%CIs). Yellow circles correspond to prefectures (*villages*) following hypoendemic trends in *A*: Avé (*Agotime, Alokpa*), Yoto (*Adikpe, Agoto, Atikpatafo, Avegodoe, Batoe, Drougbokopé, Haho-Kpodji, Kpeho, Moussouhoe, Noussoukopé, Sakpa-Kpensi, Tofa-Kopé, Tokpli (Zoume), Tove*), and Zio (*Agomenou, Akati Zogbe, Ake-Kondji, Dekpo, Esse Koleve, Frangadoua, Voule*). Orange circles denote prefectures (villages) following mesoendemic trends in *B*: Bas-Mono (*Afomonou, Gbandidi*), and Zio (*Afokonou*). Brown circles indicate prefectures (*villages*) following hyperendemic trends in *C*: Avé (*Kayido, Konta & Agbatehi*), Yoto (*Afangadji, Dzrekpon/Djrekpon, Gogokondji, Lakata-Kondji, Mawussou*) and Zio (*Togba*). For each BMP setting and intervention scenario, the average of 100 model repeats was used to calculate the mean microfilarial prevalence dynamics (blue lines). Dark blue lines represent the reference scenario; light blue lines above and below dark blue lines indicate the minimal and enhanced scenarios, respectively. Vertical coloured lines indicate: start of VC (light green); start of annual MDA (red); end of VC (dark green).

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