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## Supplementary Information

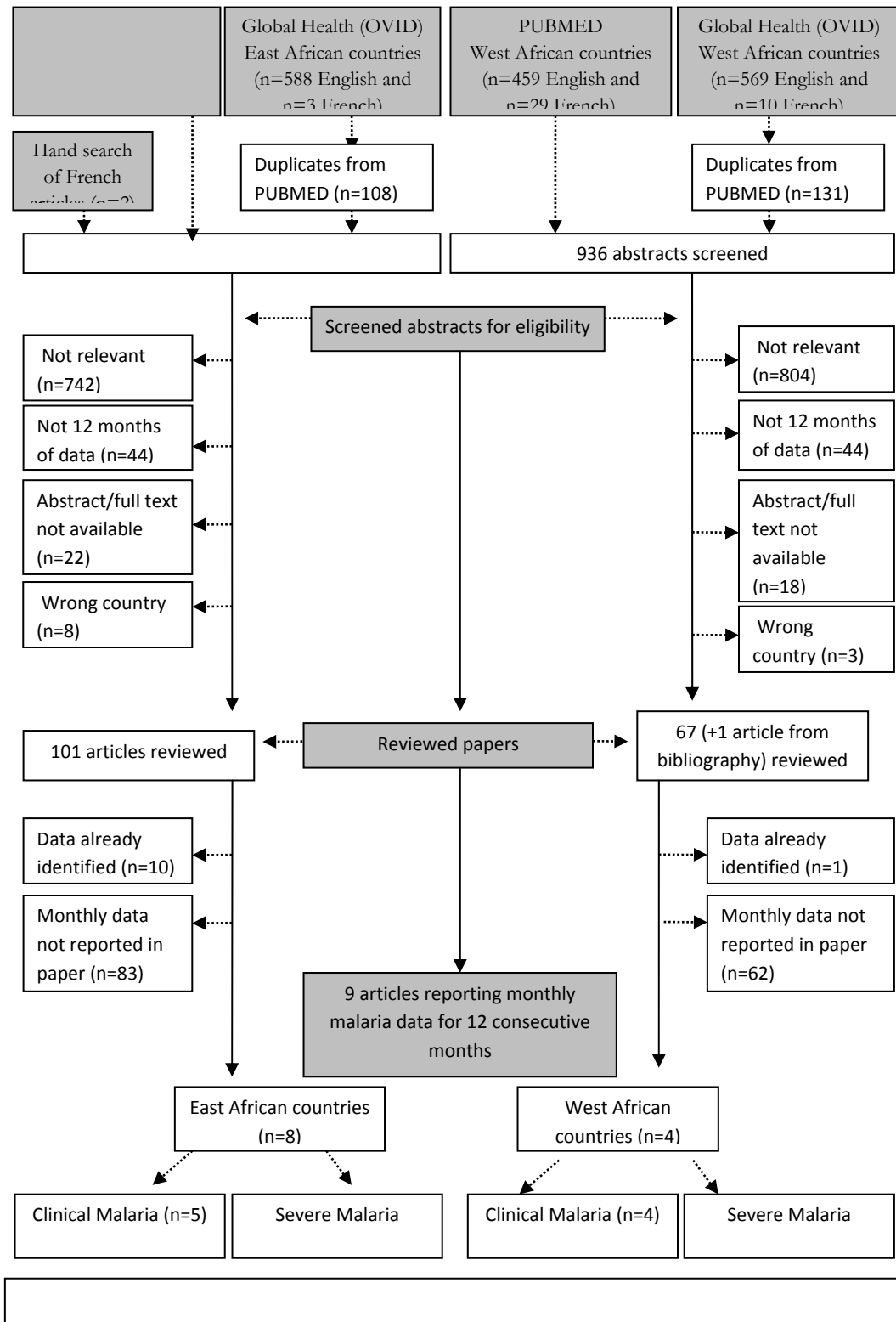
### Estimating the potential public health impact of seasonal malaria chemoprevention in African children

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**Supplementary Figure S1. Literature review and data abstraction flow chart**

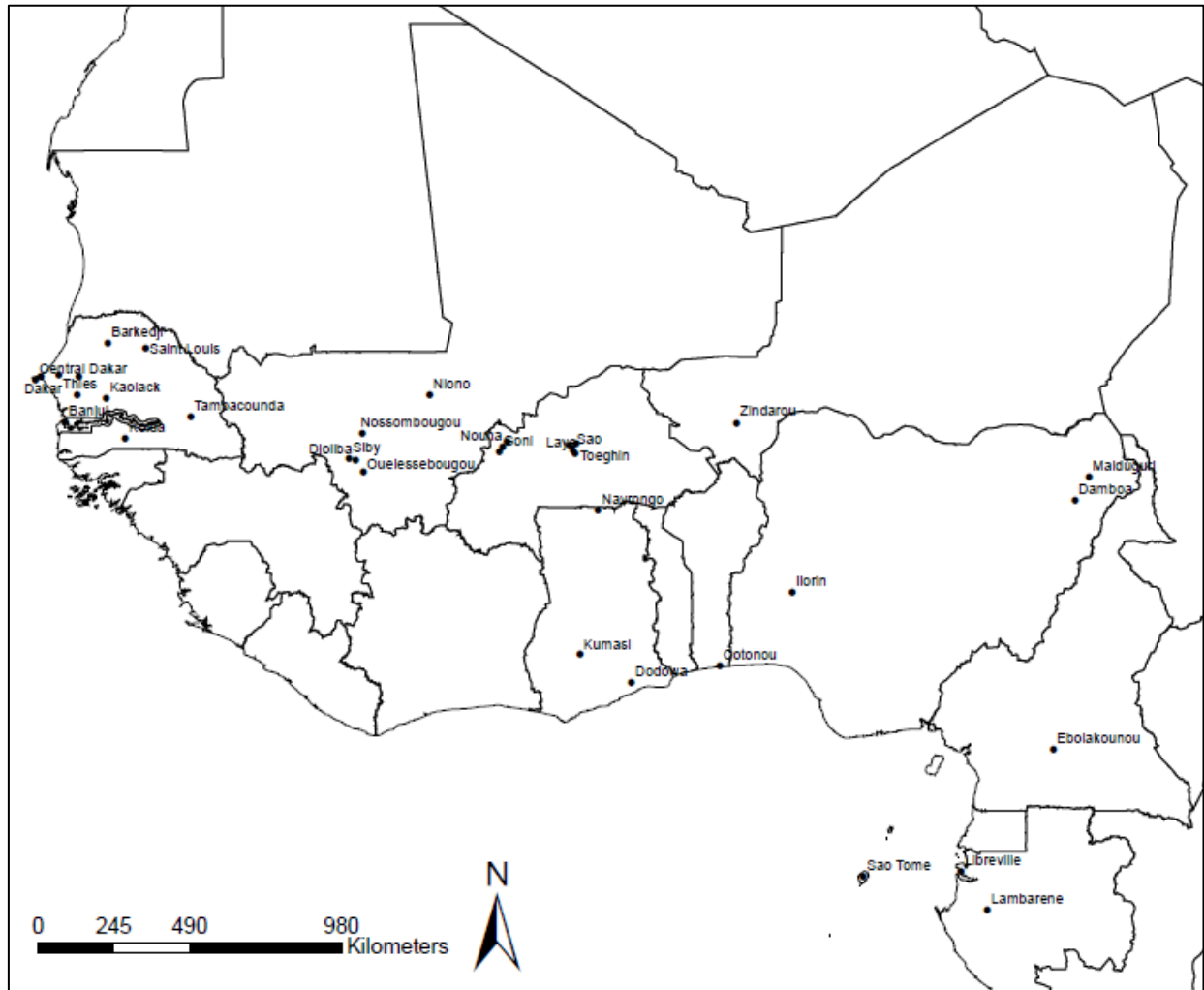


**Supplementary Figure S2. Map showing the location of available data points describing the seasonality of the incidence of malaria episodes for East Africa**



The locations of sites for which monthly incidence data was available were mapped using ArcGIS version 9.2 (ESRI, CA, USA). Co-ordinates of data points were obtained from the published paper or using the Geographic Names Database maintained by the National Geospatial Intelligence Agency (<http://earth-info.nga.mil/gns/html/namefiles.htm> ) supported by ancillary data from the published paper, where possible.

**Supplementary Figure S3. Map showing the location of available data points describing the seasonality of the incidence of malaria episodes for West Africa**



The locations of sites for which monthly incidence data was available were mapped using ArcGIS version 9.2 (ESRI, CA, USA). Co-ordinates of data points were obtained from the published paper or using the Geographic Names Database maintained by the National Geospatial Intelligence Agency (<http://earth-info.nga.mil/gns/html/namefiles.htm>) supported by ancillary data from the published paper, where possible.

**Supplementary Table S1. Seasonality assessment of clinical malaria incidence**

| Site (country)                             | Method             | Reference            | Study period     | Highest percent of annual incidence in 4 consecutive months*       | Comment            |
|--|--------------------|----------------------|------------------|--|--------------------|
| <b>West and Central Africa</b>             |                    |                      |                  |  |                    |
| Cotonou (Benin)                            | Review             | <sup>33</sup>        | Jan to Dec 04    | 45.2   | Bimodal            |
| Bousse District, IPTc sites (Burkina Faso) | Review             | Diallo <sup>§</sup>  | Dec 08 to Nov 09 | <b>89.1</b>  |                    |
| Cisse (Burkina Faso)                       | Review             | <sup>34</sup>        | Dec 03 to Nov 04 | 57.8 <sup>f</sup>  |                    |
| Goni (Burkina Faso)                        | Review             | <sup>34</sup>        | Dec 03 to Nov 04 | <b>63.5</b>  |                    |
| Nouna (Burkina Faso)                       | Review             | <sup>34</sup>        | Dec 03 to Nov 04 | 57.5 <sup>f</sup>  |                    |
| Ebolakounou & Koundou (Cameroon)           | From <sup>12</sup> | <sup>35</sup>        | Jun 97 to May 98 | 58.4   | Bimodal            |
| Lambarene (Gabon)                          | From <sup>12</sup> | <sup>36</sup>        | Apr 03 to Mar 05 | 49.3   |                    |
| Dodowa (Ghana)                             | Review             | <sup>37</sup>        | Sep94 to Aug95   | 55.3   | Bimodal            |
| Navrongo (Ghana)                           | From <sup>12</sup> | <sup>38</sup>        | Oct 00 to Sep 03 | <b>66.8</b>  |                    |
| Navrongo (Ghana)                           | Review             | Hodgson <sup>§</sup> | Jan 07 to Dec 09 | <b>78.1 (2007)</b><br><b>70.6 (2008)</b><br><b>71.7 (2009)</b>     |                    |
| Kalanampala (Mali)                         | From <sup>12</sup> | <sup>39</sup>        | Jan to Dec 97    | <b>80.5</b>  |                    |
| Kati Region, IPTc sites (Mali)             | Review             | Diallo <sup>§</sup>  | Dec 08 to Nov 09 | <b>83.6</b>  |                    |
| Nonzombougou (Mali)                        | review             | Dicko <sup>§</sup>   | Jan to Dec 07    | <b>89.4</b>  |                    |
| Tenegue (Mali)                             | From <sup>12</sup> | <sup>39</sup>        | Jan to Dec 97    | 54.2 <sup>f</sup>  |                    |
| Zindarou (Niger)                           | Review             | Fandeur <sup>§</sup> | Jul 08 to Jun 09 | <b>63.5</b>  |                    |
| Barkedji (Senegal)                         | Review             | <sup>40</sup>        | Nov 94 to Oct 95 | <b>78.4</b>  |                    |
| Dakar region (Senegal)                     | Review             | PNLP                 | Jan to Dec 08    | <b>65.1</b>  |                    |
| Diourbel region (Senegal)                  | Review             | PNLP                 | Jan to Dec 08    | <b>83.1</b>  |                    |
| Fatick region (Senegal)                    | Review             | PNLP                 | Jan to Dec 08    | <b>61.9</b>  |                    |
| Kaolack region (Senegal)                   | Review             | PNLP                 | Jan to Dec 08    | <b>83.5</b>  |                    |
| Kolda region (Senegal)                     | Review             | PNLP                 | Jan to Dec 08    | <b>77</b>  |                    |
| Saint-Louis region (Senegal)               | Review             | PNLP                 | Jan to Dec 08    | 53.1 <sup>f</sup>  |                    |
| Tambacounda region (Senegal)               | Review             | PNLP                 | Jan to Dec 08    | <b>80.6</b>  |                    |
| Thies region (Senegal)                     | Review             | PNLP                 | Jan to Dec 08    | <b>60.4</b>  |                    |
| <b>East and Southern Africa</b>            |                    |                      |                  |  |                    |
| Karuzi (Burundi)                           | Review             | <sup>41</sup>        | Jan 97 to Dec 03 | <45 (1997-99, 2002-03)<br><b>67.4 (2000)</b><br><b>65.3 (2001)</b> | Epidemic in 2000-1 |
| Asembo (Kenya)                             | From <sup>12</sup> | <sup>42</sup>        | Jan 03 to Dec 05 | 49.7   |                    |
| Manhica (Mozambique) <sup>f</sup>          | From <sup>12</sup> | <sup>43</sup>        | Jan 97 to Dec 97 | 43   |                    |
| Manhica (Mozambique) <sup>f</sup>          | From <sup>12</sup> | <sup>43</sup>        | Jan 98 to Dec 98 | 47.9   |                    |
| Manhica (Mozambique) <sup>f</sup>          | From <sup>12</sup> | <sup>44</sup>        | Oct 02 to Sep 03 | 41.8   |                    |
| Daraweesh (Sudan)                          | Review             | Giha <sup>§</sup>    | Aug 98 to Jul 00 | <b>93.1</b>  |                    |
| Eastern Sudan                              | From <sup>12</sup> | <sup>45</sup>        | Jan to Dec 97    | 43.7   |                    |
| Idete (Tanzania)                           | From <sup>12</sup> | <sup>46-48</sup>     | Aug 93 to Jul 94 | 41   |                    |
| Ifakara (Tanzania)                         | From <sup>12</sup> | <sup>49</sup>        | Aug 99 to Jul 01 | 55.7 <sup>f</sup>  |                    |
| Ifakara (Tanzania)                         | From <sup>12</sup> | <sup>50</sup>        | Jul 00 to Jun 01 | 44.7   |                    |
| Kampala (Uganda)                           | From <sup>12</sup> | <sup>51</sup>        | Nov 04 to Oct 05 | 45.4   | Bimodal            |
| Gokwe District (Zimbabwe)                  | From <sup>12</sup> | <sup>52</sup>        | Jan to Dec 2003  | 58.0 <sup>f</sup>  |                    |
| Gweru District (Zimbabwe)                  | From <sup>12</sup> | <sup>52</sup>        | Jan to Dec 2003  | 38   |                    |
| Kwekwe District (Zimbabwe)                 | From <sup>12</sup> | <sup>52</sup>        | Jan to Dec 2003  | 36.7   |                    |

<sup>§</sup> pers. comm. \*Sites highlighted in bold indicate sites fulfilling definition B; <sup>f</sup>Additional sites found to show 'SMC seasonality' if Definition C is used; PNL: Programme National de Lutte contre le Paludisme

**Supplementary Table S2. Seasonality assessment of severe malaria incidence**

| Site (country)                  | Method             | Reference            | Study period            | Highest fraction of annual burden in 4 consecutive months* | Comment |
|---------------------------------|--------------------|----------------------|-------------------------|--|---------|
| <b>West and Central Africa</b>  |                    |                      |                         |  |         |
| Luanda (Angola)                 | From <sup>12</sup> | <sup>53</sup>        | Jan to Dec 01           | 57.8 <sup>f</sup>  |         |
| Lambarene (Gabon)               | From <sup>12</sup> | <sup>54</sup>        | Jan 01 to Dec 04        | 39.3   |         |
| Libreville (Gabon)              | From <sup>12</sup> | <sup>54</sup>        | Feb 01 to Jan 05        | 39.9   |         |
| Banjul (Gambia, The)            | From <sup>12</sup> | <sup>55</sup>        | Jan to Dec 91           | <b>69</b>  |         |
| Banjul (Gambia, The)            | From <sup>12</sup> | <sup>56</sup>        | Jan 97 to Dec 01        | <b>86.4</b>  |         |
| Banjul (Gambia, The)            | From <sup>12</sup> | <sup>54</sup>        | Apr 02 to Mar 05        | <b>64.2</b>  |         |
| Kumasi (Ghana)                  | From <sup>12</sup> | <sup>54</sup>        | Feb 01 to Jan 05        | 50.8 <sup>f</sup>  |         |
| Navrongo (Ghana)                | Review             | <sup>57</sup>        | May 03 to Apr 04        | <b>67.3</b>  |         |
| Nonzombougou (Mali)             | Review             | Dicko <sup>§</sup>   | Jan to Dec 07           | <b>90</b>  |         |
| Damboa (Nigeria)                | Review             | Tunji <sup>§</sup>   | Jan 04 to Dec 06        | <b>80.9</b>  | Bimodal |
| Ilorin (Nigeria)                | Review             | Mokuolu <sup>§</sup> | Dec 09 to Nov 10        | 47.4   |         |
| Maiduguri (Nigeria)             | From <sup>12</sup> | <sup>58</sup>        | Jan 95 to Dec 96        | <b>61.1</b>  |         |
| Sao Tome & Principe             | Review             | <sup>59</sup>        | Jan to Dec 2009         | 52.6   |         |
| Dakar (Senegal)                 | From <sup>12</sup> | <sup>60</sup>        | Oct 91 to Sep 92        | 46.2   |         |
| <b>East and Southern Africa</b> |                    |                      |                         |  |         |
| Gambella (Ethiopia)             | Review             | <sup>61</sup>        | Jun 97 to May 98        | <b>61.2</b>  | Bimodal |
| Kilifi (Kenya)                  | From <sup>12</sup> | <sup>62</sup>        | Jan to Dec 91           | 48.2   | Bimodal |
| Kilifi (Kenya)                  | From <sup>12</sup> | <sup>54</sup>        | Jul 01 to Jun 05        | 41.2   | Bimodal |
| Blantyre (Malawi)               | From <sup>12</sup> | <sup>54</sup>        | Apr 01 to Mar 05        | 47.3   |         |
| Manhica (Mozambique)            | Review             | <sup>63</sup>        | Jun 03 to May 05        | 43.2   |         |
| Maputo (Mozambique)             | From <sup>12</sup> | <sup>64</sup>        | May 95 to Apr 97        | <b>74.6</b>  |         |
| Huruma (Tanzania)               | From <sup>12</sup> | <sup>65</sup>        | Feb 02 to Jan 03        | 58.7 <sup>f</sup>  | Bimodal |
| Ifakara (Tanzania)              | From <sup>12</sup> | <sup>66</sup>        | Jan to Dec<br>1995/2000 | 43.2   |         |
| Kibosho (Tanzania)              | From <sup>12</sup> | <sup>65</sup>        | Feb 02 to Jan 03        | 50.5 <sup>f</sup>  |         |
| Mnero (Tanzania)                | From <sup>12</sup> | <sup>65</sup>        | Feb 02 to Jan 03        | 46.5   |         |
| Moshi (Tanzania)                | From <sup>12</sup> | <sup>65</sup>        | Feb 02 to Jan 03        | 44.9   |         |
| Same (Tanzania)                 | From <sup>12</sup> | <sup>65</sup>        | Feb 02 to Jan 03        | 55.5 <sup>f</sup>  |         |
| Teule (Tanzania)                | From <sup>12</sup> | <sup>65</sup>        | Feb 02 to Jan 03        | 43.2   |         |
| Kabale (Uganda)                 | Review             | <sup>67</sup>        | Mar 02 to Feb 03        | 48.2   | Bimodal |
| Kabale (Uganda)                 | Review             | <sup>68</sup>        | Jan 97 to Dec 98        | 35.6   | Bimodal |
| Hoima (Uganda)                  | Review             | <sup>68</sup>        | Jan 97 to Dec 98        | 35.2   | Bimodal |
| Macha (Zambia)                  | From <sup>12</sup> | <sup>69</sup>        | Jan 03 to Dec 04        | 76.4   |         |

<sup>§</sup> pers. comm. \*Sites highlighted in bold indicate sites fulfilling definition B; <sup>f</sup>Additional sites found to show 'SMC seasonality' if Definition C is used.

**Supplementary Table S3. Populations mapped by >60% of annual rainfall in 3 months**

|                     | Total population <sup>§</sup> | Population in SMC area <sup>^</sup> | Percent in SMC zone | Under 5 population in SMC area <sup>#</sup> | Percent urban |
|---------------------|-------------------------------|-------------------------------------|---------------------|---|---------------|
| Benin               | 8,812,518                     | 557,092                             | 6%                  | 92,422                                      | 24%           |
| Burkina Faso        | 15,708,964                    | 13,854,376                          | 88%                 | 2,710,747                                   | 45%           |
| Cameroon            | 19,126,809                    | 2,950,626                           | 15%                 | 460,947                                     | 45%           |
| Chad                | 10,912,155                    | 7,134,093                           | 65%                 | 1,279,072                                   | 31%           |
| Gambia              | 1,852,882                     | 1,852,882                           | 100%                | 291,403                                     | 68%           |
| Ghana               | 24,501,245                    | 177,859                             | 1%                  | 24,934                                      | 60%           |
| Guinea              | 10,574,798                    | 5,995,674                           | 57%                 | 986,348                                     | 44%           |
| Guinea-Bissau       | 1,562,554                     | 1,560,770                           | 100%                | 259,868                                     | 47%           |
| Mali                | 13,117,059                    | 12,387,872                          | 94%                 | 2,146,942                                   | 33%           |
| Mauritania          | 3,597,585                     | 3,403,999                           | 95%                 | 492,252                                     | 39%           |
| Niger               | 14,436,029                    | 14,376,419                          | 100%                | 3,095,243                                   | 39%           |
| Nigeria             | 145,248,683                   | 37,671,263                          | 26%                 | 6,135,519                                   | 52%           |
| Senegal             | 13,481,010                    | 13,472,934                          | 100%                | 2,235,833                                   | 60%           |
| Sierra Leone        | 6,629,124                     | 2,563,964                           | 39%                 | 430,567                                     | 69%           |
| Sudan               | 42,415,970                    | 32,765,822                          | 77%                 | 4,490,228                                   | 46%           |
| Western Sahara      | 434,628                       | 52,568                              | 12%                 | 5,477                                       | 95%           |
| <b>TOTAL SAHEL</b>  | <b>332,412,013</b>            | <b>150,778,213</b>                  |                     | <b>25,137,802</b>                           |               |
| Angola              | 13,421,810                    | 766,379                             | 6%                  | 130,875                                     | 44%           |
| Botswana            | 1,890,943                     | 254,314                             | 13%                 | 29,119                                      | 22%           |
| D. R Congo          | 71,412,940                    | 1,871,914                           | 3%                  | 335,466                                     | 86%           |
| Djibouti            | 525,782                       | 21,708                              | 4%                  | 2,683                                       | 3%            |
| Egypt               | 84,731,710                    | 17,352,928                          | 20%                 | 1,983,787                                   | 95%           |
| Eritrea             | 5,333,163                     | 4,926,333                           | 92%                 | 800,923                                     | 54%           |
| Ethiopia            | 81,845,206                    | 23,420,878                          | 29%                 | 3,808,703                                   | 50%           |
| Kenya               | 39,835,135                    | 331,710                             | 1%                  | 55,837                                      | 59%           |
| Malawi              | 14,825,033                    | 14,582,132                          | 98%                 | 2,490,628                                   | 42%           |
| Mozambique          | 22,526,159                    | 13,858,847                          | 62%                 | 2,286,710                                   | 23%           |
| Namibia             | 2,126,549                     | 1,930,604                           | 91%                 | 245,669                                     | 47%           |
| Tanzania            | 42,861,827                    | 9,074,545                           | 21%                 | 1,614,361                                   | 32%           |
| Zambia              | 12,393,193                    | 11,235,159                          | 91%                 | 2,007,835                                   | 40%           |
| Zimbabwe            | 12,276,732                    | 8,099,518                           | 66%                 | 1,109,067                                   | 47%           |
| <b>TOTAL OTHER</b>  | <b>406,006,182</b>            | <b>107,726,969</b>                  | <b>27%</b>          | <b>16,901,663</b>                           |               |
| <b>TOTAL AFRICA</b> | <b>738,418,195</b>            | <b>258,505,182</b>                  |                     | <b>42,039,465</b>                           |               |

§ LandScan population estimate adjusted to 2010 using population growth projections from the UN World Population Prospects (WPP) 2008. ^ Estimated from LandScan populations in areas mapped by seasonality in rainfall (>60% of annual total rainfall occurs in 3 months), also adjusted to 2010 using UN WPP projections. # Estimated using percentage aged 0-4 in UN WPP 2008, using estimates for 2010. % urban are estimated from population density threshold as described in the text.



**Supplementary Table S4. Populations at risk in seasonal areas defined by the MARA seasonality map**

| Country        | Total Population <sup>§</sup> | Population in SMC zone <sup>^</sup> | % in SMC zone | Under 5 population in SMC zone <sup>#</sup> | % low risk | % high risk | % urban |
|----------------|-------------------------------|-------------------------------------|---------------|---|------------|-------------|---------|
| Benin          | 9,211,741                     | 756,914                             | 8%            | 125,572                                     | 0%         | 100%        | 42%     |
| Burkina Faso   | 16,286,706                    | 15,135,571                          | 93%           | 2,961,426                                   | 0%         | 100%        | 26%     |
| Cameroon       | 19,958,351                    | 6,694,266                           | 34%           | 1,045,778                                   | 19%        | 74%         | 58%     |
| CAR            | 4,505,945                     | 129,623                             | 3%            | 19,057                                      | 0%         | 100%        | 39%     |
| Chad           | 11,506,130                    | 10,777,985                          | 94%           | 1,932,385                                   | 9%         | 86%         | 28%     |
| Gambia         | 1,750,732                     | 1,750,732                           | 100%          | 275,338                                     | 0%         | 100%        | 58%     |
| Ghana          | 24,332,755                    | 1,664,040                           | 7%            | 233,282                                     | 2%         | 98%         | 51%     |
| Guinea         | 10,323,755                    | 1,033,949                           | 10%           | 170,095                                     | 1%         | 99%         | 35%     |
| Guinea-Bissau  | 1,647,380                     | 1,139,857                           | 69%           | 189,786                                     | 0%         | 100%        | 30%     |
| Mali           | 13,323,104                    | 11,911,186                          | 89%           | 2,064,328                                   | 8%         | 90%         | 36%     |
| Mauritania     | 3,365,675                     | 1,307,914                           | 39%           | 189,137                                     | 23%        | 41%         | 41%     |
| Niger          | 15,891,482                    | 15,296,510                          | 96%           | 3,293,339                                   | 8%         | 89%         | 17%     |
| Nigeria        | 158,258,917                   | 56,407,741                          | 36%           | 9,187,129                                   | 1%         | 99%         | 50%     |
| Senegal        | 12,860,717                    | 12,852,136                          | 100%          | 2,132,812                                   | 3%         | 97%         | 42%     |
| Sudan          | 43,192,438                    | 25,490,857                          | 59%           | 3,493,267                                   | 44%        | 56%         | 40%     |
| Togo           | 6,780,030                     | 406,175                             | 6%            | 58,091                                      | 0%         | 100%        | 43%     |
| Sahel zone     | 353,195,858                   | 162,755,457                         |               | 27,370,822                                  |            |             |         |
| Angola*        | 18,992,707                    | 8,289,268                           | 44%           | 1,415,558                                   | 41%        | 46%         | 59%     |
| Botswana       | 1,977,569                     | 520,285                             | 26%           | 59,573                                      | 23%        | 13%         | 61%     |
| Burundi*       | 8,518,862                     | 1,207,773                           | 14%           | 171,673                                     | 42%        | 21%         | 11%     |
| DRC*           | 67,827,495                    | 3,764,450                           | 6%            | 674,627                                     | 6%         | 85%         | 35%     |
| Eritrea        | 5,223,994                     | 3,187,056                           | 61%           | 518,152                                     | 72%        | 16%         | 22%     |
| Ethiopia       | 84,975,606                    | 28,205,256                          | 33%           | 4,586,739                                   | 22%        | 14%         | 17%     |
| Kenya          | 40,862,900                    | 9,257,222                           | 23%           | 1,558,268                                   | 26%        | 21%         | 22%     |
| Malawi         | 15,691,784                    | 13,283,756                          | 85%           | 2,268,866                                   | 19%        | 77%         | 20%     |
| Mozambique     | 23,405,670                    | 19,068,144                          | 81%           | 3,146,244                                   | 4%         | 96%         | 38%     |
| Namibia        | 2,212,037                     | 1,295,042                           | 59%           | 164,794                                     | 59%        | 8%          | 38%     |
| Rwanda*        | 10,277,212                    | 1,022,822                           | 10%           | 173,440                                     | 41%        | 7%          | 19%     |
| South Africa*  | 50,492,408                    | 9,145,237                           | 18%           | 933,729                                     | 11%        | 15%         | 62%     |
| Swaziland*     | 1,201,904                     | 835,792                             | 70%           | 111,946                                     | 14%        | 69%         | 21%     |
| Uganda*        | 33,796,461                    | 1,865,625                           | 6%            | 361,651                                     | 16%        | 73%         | 13%     |
| Tanzania       | 45,039,573                    | 16,600,395                          | 37%           | 2,953,210                                   | 17%        | 75%         | 26%     |
| Zambia         | 13,257,269                    | 11,051,238                          | 83%           | 1,974,967                                   | 12%        | 83%         | 36%     |
| Zimbabwe       | 12,644,041                    | 6,123,000                           | 48%           | 838,422                                     | 42%        | 54%         | 38%     |
| Rest of Africa | 436,397,492                   | 134,722,362                         |               | 21,911,858                                  |            |             |         |
| Total          | 789,593,350                   | 297,477,819                         |               | 49,282,680                                  |            |             |         |

§ Estimate from the UN World Population Prospects (WPP) 2008, using estimates for 2010. ^ % of MARA populations in areas with 1-6 months suitable for malaria transmission, applied to total population in 2010. # Estimated using percentage aged 0-4 in UN WPP 2008, using estimates for 2010. % low risk and % high risk are estimated from the MARA suitability index: 0.25-0.75, low; >0.75, high; as in the World Malaria Report 2008. % urban are estimated from UN World Urbanisation Prospects 2009.

**Supplementary Table S5. Search terms used in literature review**

| <b>Pubmed</b>   | <b>Global Health</b>  |
|---|---|
| ("Malaria, Falciparum"[Mesh] AND ("Seasons"[Mesh] OR month OR "Incidence"[Mesh] OR "Epidemiology"[Mesh] OR "Cohort Studies"[Mesh] OR "Morbidity"[Mesh]))  | malaria, seasons, month, incidence, epidemiology, cohort studies, morbidity   |
| AND   | AND   |
| (Angola OR Cameroon OR (Central African Republic) OR Chad OR Congo OR (Democratic Republic of the Congo) OR (Equatorial Guinea) OR Gabon OR (Sao Tome and Principe) OR Benin OR (Burkina Faso) OR (Cape Verde) OR (Cote d'Ivoire) OR (Ivory Coast) OR Gambia OR Ghana OR Guinea OR (Guinea-Bissau) OR Liberia OR Mali OR Mauritania OR Niger OR Nigeria OR Senegal OR (Sierra Leone) OR Togo OR Algeria OR Egypt OR Libya OR Morocco OR Sudan OR Tunisia OR (Sahrawi Arab Democratic Republic)) | (Angola OR Cameroon OR Central African Republic OR Chad OR Congo OR Democratic Republic of the Congo OR Equatorial Guinea OR Gabon OR SaoTome and Principe OR Benin OR Burkina Faso OR Cape Verde OR Coted'Ivoire OR Ivory Coast OR Gambia OR Ghana OR Guinea OR Guinea-Bissau OR Liberia OR Mali OR Mauritania OR Niger OR Nigeria OR Senegal OR Sierra Leone OR Togo OR Algeria OR Egypt OR Libya OR Morocco OR Sudan OR Tunisia OR Sahrawi Arab Democratic Republic).mp. [mp=abstract, title,original title, broad terms, heading words] |
| AND   | AND   |
| (Burundi OR Comoros OR Djibouti OR Eritrea OR Ethiopia OR Kenya OR Madagascar OR Malawi OR Mauritius OR Mozambique OR Rwanda OR Seychelles OR Somalia OR Tanzania OR Uganda OR Zambia OR Botswana OR Lesotho OR Zimbabwe OR Namibia OR South Africa OR Swaziland)   | (Burundi OR Comoros OR Djibouti OR Eritrea OR Ethiopia OR Kenya orMadagascar OR Malawi OR Mauritius OR Mozambique OR Rwanda OR Seychellesor Somalia OR Tanzania OR Uganda OR Zambia OR Botswana OR Lesotho OR Zimbabwe OR Namibia OR South Africa OR Swaziland).mp. [mp=abstract,title, original title, broad terms, heading words]   |

## Supplementary Methods

### Defining the epidemiological situations suitable for SMC

A series of literature reviews were undertaken to identify studies reporting the incidence of uncomplicated malaria and/or admissions with malaria by month for 12 consecutive months. Several sources of data were used:

- published monthly malaria incidence data from a series of systematic literature reviews conducted in 2005<sup>12</sup>
- routine data from Senegal
- an additional literature review carried out in November/December 2010 in order to identify additional studies that were not included in the earlier review.

For the independent literature review, both the PubMed and Global Health (OVID) online abstracting databases were searched by two investigators. The search was limited to English and French and to articles published after the year 2000. MeSH terms were used where possible (e.g. PubMed). Studies were retained if they provided incidence data for clinical malaria or severe malaria by month for a minimum period of 12 consecutive months, and if diagnosis of malaria was parasitologically confirmed using microscopy or a rapid diagnostic test. Studies were excluded if they were conducted in countries other than those included in the search criteria (see Supplementary Table S2) and the abstract or full text of the article was not available for screening. In addition, citation searches of selected articles were also made and key investigators were contacted for additional or unpublished data. Relevant monthly data from studies were extracted into a Stata database. If data related to an intervention study, only the control/placebo group was abstracted.

### Estimating the population under five years of age at risk in SMC areas

The total population within each first administrative unit was calculated using the LandScan™ estimates of population for 2007 (<http://www.ornl.gov/sci/landscan/>). These data are synthetic estimates of populations produced by models incorporating available census data and other predictors of populations (e.g. night lights). Whilst they provide an indication of populations, in some parts of Africa there is uncertainty in these and other synthetic datasets that must be borne in mind<sup>70</sup>.

The population living in the area identified as suitable for SMC based on seasonality in rainfall and, if appropriate, lower thresholds of malaria endemicity was then calculated within each first administrative unit. Population estimates were adjusted for growth since 2007 by scaling up by the change in total country population from the UN WPP data<sup>23</sup>. The percentage living in urban areas within the SMC zones was estimated. The total population in SMC areas (and in urban areas within the SMC areas) was then summed across administrative units for each country. The number of children under 5 years of age was estimated by applying the national percentage of children aged 0-4 years from UN World Population Prospects (WPP) 2008, using the estimates for 2010<sup>23</sup>.

The datasets used in this analysis were available at varying resolution, and we therefore went through a number of aggregation stages. The LandScan population estimates are available as a high resolution dataset with 1/120 degree resolution (approx. 1 km<sup>2</sup> at the equator). At this resolution each pixel was classified as urban or rural, using a definition of >386 individuals per km<sup>2</sup> as urban<sup>24</sup>. This dataset was then aggregated to a resolution of 1/24 degree (approx 5 km<sup>2</sup> at the equator), to match each pixel to the malaria endemicity status<sup>71</sup>. The rainfall data are available at 0.1 degree

resolution, however, here we used a reduced grid of 0.2 degree resolution to classify locations as suitable for SMC based on malaria endemicity and rainfall seasonality. As the estimates of the percentage of children and population growth were available at country level only, we aggregated the populations by administrative unit and in a last step applied the population growth rate and estimated the number of children.

To provide an alternative comparison with the LandScan™ population estimates in areas determined by rainfall and Malaria Atlas Project estimates of malaria endemicity, population estimates from the Mapping Malaria Risk in Africa (MARA) data were extracted<sup>13</sup>. Populations living in areas defined as 'epidemic and strongly seasonal, 1-3 months transmission', or 'endemic and seasonal, 4-6 months transmission' were used. Although the MARA categorisation of '4-6 months suitable for malaria transmission' suggests a longer period of transmission than potentially suitable for SMC, the geographical areas mapped by the areas fitting this definition overlap very closely with those identified as suitable for SMC using the methods based on seasonality in rainfall described previously. The percentage of the total population living in these two seasonality categories were applied to the total country population estimates using the UN WPP projections for 2010<sup>23</sup>. The proportion of individuals living in urban areas were extracted from the UN World Urbanization Prospects 2009, using estimates for 2010<sup>72</sup>. As for the previous method, the number of children under 5 years of age was estimated by using the percentage of children aged 0-4 in the UN World Population Prospects (WPP) 2008, using the estimates for 2010<sup>23</sup>.

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