**SUPPLEMENTARY TABLES AND FIGURES**

Supplementary Table 1. Brief description of unpublished studies

| Study Abbreviation | Brief Study Description |
| --- | --- |
| IND-UNI | This cross-sectional study was conducted among male and female college and university students in the West Midnapore district of West Bengal. Data collection took place between March 2013 and June 2014. The primary objectives of the study were to examine the associations between various anthropometric measures and nutritional status and to examine differences in anthropometric measures by sex. In addition, the study examined the associations between anthropometric measures, nutritional status, age at menarche, and menstrual characteristics among the female students. Participants were recruited through opportunity sampling by visiting the post-graduate departments in Vidyasagar University, the university’s student housing, and a number of students’ private houses in the town of Midnapore. All the students/ residents (aged 18–28 years) who were present at the time of visit were invited to participate in the study and the purpose of the study was explained to them. Students had to be reportedly and apparently fit without any current or very recent episode of infirmity and not physically or mentally challenged. Those who agreed to participate and gave verbal consent were included. Data were collected using a pretested questionnaire administered by trained research assistants. Height, weight, and MUAC were measured on all participants using standard techniques (Lohman et al. 1988). Height was measured to the nearest 0.1 cm, weight to the nearest 0.1 kg, and MUAC to the nearest 0.1 cm. |
| MAL-HNW | This was an unblinded randomized trial to determine the impact of nutrition education and counseling plus 2 weeks of a ready-to-use therapeutic food (RUTF) intervention after each episode of a mild or severe common or opportunistic infection, compared to nutrition education and counseling alone, on nutritional status among people living with HIV. Eligibility criteria included the following: confirmed HIV-positive status; WHO stages I or II; CD4 count ≥500 cells/ml; good nutritional status as determined by absence of edema; MUAC >22.0 cm for women and >23.0 cm for men; BMI >18.5 and no history of weight loss above 5% of usual weight; no clinical signs of wasting; physically active; permanent resident of the catchment area of the facility; and willingness to participate. (Note that five participants with BMI ≤18.5 were enrolled into the study in error: four with BMI=18.5 and one with BMI=18.1; however, these five participants were kept in the dataset for the current analysis as the association between MUAC and BMI in these participants would still be relevant.) Participants were recruited from two urban (Lilongwe and Mzuzu) and one rural (Kasungu) voluntary counseling and testing centers run by MACRO in central and northern Malawi. A voluntary counseling and testing center based at Likhuni Hospital, a rural hospital of the Lilongwe Health District, was later added.Height, weight, and MUAC measurement were obtained using the same guidelines as stated above for MAL-HWW. |
| NAM | The objective of this cross-sectional study was to determine the nutritional, mental, and behavioral effects of heavy alcohol use among a population at high risk for HIV in Windhoek, Namibia. Participants were recruited from Eveline Street in the Katutura district, an area where bar and shebeen density is high. The study took place on the street outside of bars in study tents. Participants were recruited through street outreach and word of mouth. Individuals were eligible if they were ≥18 years of age; able to communicate in English, Oshiwambo, or Afrikaans; and not intoxicated. All participants in this study were eligible for this IPDMA.  Height and weight were measured on each participant wearing light clothing and with shoes removed. Height was measured to the nearest 0.1 cm using a portable, free-standing stadiometer, and weight was measured to the nearest 0.1 kg using a digital scale. MUAC was measured to the nearest 0.1 cm on the right arm at the midpoint between the acromion process of the scapula and the olecranon process of the ulna using a Gulick II tape with a tension device. |

Supplementary Table 1. Brief description of unpublished studies (cont’d)

|  |  |
| --- | --- |
| Study Abbreviation | Brief Study Description |
| ZAM | The primary objective of this randomized controlled trial was to determine the effect of treatment with RUTF on blood lipid profiles in HIV-infected adults on ART. Participants were followed prospectively during nutrition rehabilitation until cure, default, or death. Patients were recruited from those who were assessed as eligible for ART in Lusaka (urban setting) ART clinics based at Chipata, a governmental health center. Participants were eligible if they were eligible for ART or had started ART within past 4 weeks; between the ages of 18 and 49 years; had a MUAC <22.0 cm or BMI <17.0; and a CD4 count >50 cells/mm3.Height, weight, and MUAC were measured according to the same protocol as described above in MAL-HWW. |

Supplementary Table 2. Sensitivity (SENS), specificity (SPEC), positive (PPV) and negative (NPV) predictive values for a MUAC cutoff of 19·0 cm in predicting low BMI.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| MUAC ≤ 19·0 | SENS | 95 % CI | SPEC | 95 % CI | PPV | 95 % CI | NPV | 95 % CI |
| ARG | ---a | ---, --- | --- | ---, --- | --- | ---, --- | --- | ---, --- |
| BAN | 0·5 | 0, 2·9 | 99·8 | 98·8, 100 | 50 | 1·3, 98·7 | 70·8 | 67·2, 74·3 |
| GUI-HIV | 13 | 9·9, 16·8 | 99·7 | 98·9, 100 | 96·2 | 87, 99·5 | 65·7 | 62·7, 68·7 |
| GUI-TBC | --- | ---, --- | --- | ---, --- | --- | ---, --- | --- | ---, --- |
| IND-BKW | --- | ---, --- | --- | ---, --- | --- | ---, --- | --- | ---, --- |
| IND-FSD | 20·9 | 14·8, 28·2 | 98·3 | 95·2, 99·7 | 91·4 | 76·9, 98·2 | 59·4 | 53·6, 65 |
| IND-IDU | 7·1 | 3·9, 11·6 | 100 | 97·9, 100 | 100 | 76·8, 100 | 48·6 | 43·3, 53·9 |
| IND-MSD | 5·8 | 2·7, 10·7 | 99·4 | 97·7, 99·9 | 81·8 | 48·2, 97·7 | 68·3 | 63·8, 72·5 |
| IND-ORA | 0 | 0, 2·7 | 95·8 | 88·3, 99·1 | 0 | 0, 70·8 | 34·2 | 27·6, 41·1 |
| IND-SDW | 25·5 | 20, 31·7 | 98·9 | 97·9, 99·5 | 88·1 | 77·8, 94·7 | 81·4 | 78·7, 83·9 |
| IND-UNI | 4·4 | 1·2, 11 | 99·8 | 98·9, 100 | 80 | 28·4, 99·5 | 85·5 | 82·4, 88·3 |
| MAL-HNW | --- | ---, --- | --- | ---, --- | --- | ---, --- | --- | ---, --- |
| MAL-HWW | 32·9 | 25·7, 40·8 | 100 | 83·2, 100 | 100 | 93·3, 100 | 15·6 | 9·8, 23·1 |
| NAM | 0 | 0, 10 | 99·7 | 98·5, 100 | 0 | 0, 97·5 | 91·3 | 88·1, 93·9 |
| SAF | 6·7 | 0·2, 31·9 | 100 | 98·6, 100 | 100 | 2·5, 100 | 95 | 91·7, 97·2 |
| USA-HIV | --- | ---, --- | --- | ---, --- | --- | ---, --- | --- | ---, --- |
| USA-IDU | 5·6 | 0·1, 27·3 | 100 | 99·3, 100 | 100 | 2·5, 100 | 96·7 | 94·8, 98·1 |
| VIE-FEM | 0·8 | 0·4, 1·4 | 100 | 99·8, 100 | 92·3 | 64, 99·8 | 68·8 | 67·4, 70·1 |
| VIE-IDU | 2·6 | 0·3, 9 | 100 | 98·3, 100 | 100 | 15·8, 100 | 74·2 | 68·8, 79·1 |
| ZAM | 16 | 10·8, 22·6 | 90 | 68·3, 98·8 | 92·9 | 76·5, 99·1 | 11·7 | 7·1, 17·8 |

a ‘---’ indicates studies that did not have individuals with MUAC measurements in this range.

Supplementary Table 3. Sensitivity (SENS), specificity (SPEC), positive (PPV) and negative (NPV) predictive values for a MUAC cutoff of 19·5 cm in predicting low BMI.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| MUAC ≤ 19·5 | SENS | 95 % CI | SPEC | 95 % CI | PPV | 95 % CI | NPV | 95 % CI |
| ARG | --- | ---, --- | --- | ---, --- | --- | ---, --- | --- | ---, --- |
| BAN | 1·1 | 0·1, 3·8 | 99·8 | 98·8, 100 | 66·7 | 9·4, 99·2 | 70·9 | 67·3, 74·4 |
| GUI-HIV | 14·1 | 10·8, 17·9 | 99·7 | 98·9, 100 | 96·5 | 87·9, 99·6 | 66 | 62·9, 68·9 |
| GUI-TBC | --- | ---, --- | --- | ---, --- | --- | ---, --- | --- | ---, --- |
| IND-BKW | --- | ---, --- | --- | ---, --- | --- | ---, --- | --- | ---, --- |
| IND-FSD | 28·1 | 21·1, 35·9 | 97·2 | 93·6, 99·1 | 89·6 | 77·3, 96·5 | 61·4 | 55·5, 67·1 |
| IND-IDU | 9·1 | 5·5, 14 | 100 | 97·9, 100 | 100 | 81·5, 100 | 49·2 | 43·8, 54·5 |
| IND-MSD | 7·7 | 4, 13·1 | 99·4 | 97·7, 99·9 | 85·7 | 57·2, 98·2 | 68·7 | 64·2, 72·9 |
| IND-ORA | 3 | 0·8, 7·5 | 95·8 | 88·3, 99·1 | 57·1 | 18·4, 90·1 | 34·8 | 28·2, 41·9 |
| IND-SDW | 34·6 | 28·5, 41·2 | 97·8 | 96·4, 98·7 | 82·5 | 73·4, 89·4 | 83·1 | 80·5, 85·5 |
| IND-UNI | 7·8 | 3·2, 15·4 | 99·8 | 98·9, 100 | 87·5 | 47·3, 99·7 | 86 | 82·9, 88·7 |
| MAL-HNW | --- | ---, --- | --- | ---, --- | --- | ---, --- | --- | ---, --- |
| MAL-HWW | 41·6 | 33·9, 49·6 | 95 | 75·1, 99·9 | 98·5 | 92·1, 100 | 16·8 | 10·4, 25 |
| NAM | 0 | 0, 10 | 99·7 | 98·5, 100 | 0 | 0, 97·5 | 91·3 | 88·1, 93·9 |
| SAF | 6·7 | 0·2, 31·9 | 100 | 98·6, 100 | 100 | 2·5, 100 | 95 | 91·7, 97·2 |
| USA-HIV | --- | ---, --- | --- | ---, --- | --- | ---, --- | --- | ---, --- |
| USA-IDU | 16·7 | 3·6, 41·4 | 100 | 99·3, 100 | 100 | 29·2, 100 | 97·1 | 95·3, 98·4 |
| VIE-FEM | 1·5 | 0·9, 2·2 | 100 | 99·8, 100 | 95·8 | 78·9, 99·9 | 68·9 | 67·6, 70·2 |
| VIE-IDU | 2·6 | 0·3, 9 | 100 | 98·3, 100 | 100 | 15·8, 100 | 74·2 | 68·8, 79·1 |
| ZAM | 21 | 15, 28·1 | 90 | 68·3, 98·8 | 94·4 | 81·3, 99·3 | 12·3 | 7·5, 18·8 |

Supplementary Table 4. Sensitivity (SENS), specificity (SPEC), positive (PPV) and negative (NPV) predictive values for a MUAC cutoff of 20·0 cm in predicting low BMI.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| MUAC ≤ 20·0 | SENS | 95 % CI | SPEC | 95 % CI | PPV | 95 % CI | NPV | 95 % CI |
| ARG | --- | ---, --- | --- | ---, --- | --- | ---, --- | --- | ---, --- |
| BAN | 1·6 | 0·3, 4·5 | 99·8 | 98·8, 100 | 75 | 19·4, 99·4 | 71·1 | 67·4, 74·5 |
| GUI-HIV | 18·4 | 14·7, 22·6 | 99·5 | 98·7, 99·9 | 96 | 88·8, 99·2 | 67·1 | 64·1, 70·1 |
| GUI-TBC | --- | ---, --- | --- | ---, --- | --- | ---, --- | --- | ---, --- |
| IND-BKW | 1·6 | 0·2, 5·8 | 100 | 99, 100 | 100 | 15·8, 100 | 75·8 | 71·7, 79·5 |
| IND-FSD | 41·8 | 33·9, 50·1 | 97·2 | 93·6, 99·1 | 92·8 | 83·9, 97·6 | 66·3 | 60·2, 72 |
| IND-IDU | 15·7 | 10·9, 21·5 | 100 | 97·9, 100 | 100 | 88·8, 100 | 51 | 45·6, 56·4 |
| IND-MSD | 9 | 5, 14·6 | 99·4 | 97·7, 99·9 | 87·5 | 61·7, 98·4 | 69 | 64·5, 73·2 |
| IND-ORA | 3 | 0·8, 7·5 | 95·8 | 88·3, 99·1 | 57·1 | 18·4, 90·1 | 34·8 | 28·2, 41·9 |
| IND-SDW | 47·2 | 40·6, 53·8 | 96·1 | 94·4, 97·3 | 78·4 | 70·6, 84·9 | 85·7 | 83·2, 88 |
| IND-UNI | 14·4 | 7·9, 23·4 | 99·8 | 98·9, 100 | 92·9 | 66·1, 99·8 | 86·8 | 83·8, 89·5 |
| MAL-HNW | --- | ---, --- | --- | ---, --- | --- | ---, --- | --- | ---, --- |
| MAL-HWW | 53·4 | 45·4, 61·3 | 90 | 68·3, 98·8 | 97·7 | 92, 99·7 | 19·4 | 11·9, 28·9 |
| NAM | 5·7 | 0·7, 19·2 | 99·7 | 98·5, 100 | 66·7 | 9·4, 99·2 | 91·8 | 88·6, 94·3 |
| SAF | 13·3 | 1·7, 40·5 | 100 | 98·6, 100 | 100 | 15·8, 100 | 95·3 | 92·1, 97·5 |
| USA-HIV | --- | ---, --- | --- | ---, --- | --- | ---, --- | --- | ---, --- |
| USA-IDU | 22·2 | 6·4, 47·6 | 100 | 99·3, 100 | 100 | 39·8, 100 | 97·3 | 95·5, 98·5 |
| VIE-FEM | 3·6 | 2·7, 4·7 | 100 | 99·8, 100 | 98·2 | 90·6, 100 | 69·4 | 68·1, 70·7 |
| VIE-IDU | 2·6 | 0·3, 9 | 100 | 98·3, 100 | 100 | 15·8, 100 | 74·2 | 68·8, 79·1 |
| ZAM | 33·3 | 26·1, 41·2 | 90 | 68·3, 98·8 | 96·4 | 87·7, 99·6 | 14·3 | 8·7, 21·6 |

Supplementary Table 5. Sensitivity (SENS), specificity (SPEC), positive (PPV) and negative (NPV) predictive values for a MUAC cutoff of 20·5 cm in predicting low BMI.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| MUAC ≤ 20·5 | SENS | 95 % CI | SPEC | 95 % CI | PPV | 95 % CI | NPV | 95 % CI |
| ARG | --- | ---, --- | --- | ---, --- | --- | ---, --- | --- | ---, --- |
| BAN | 5·3 | 2·6, 9·5 | 99·8 | 98·8, 100 | 90·9 | 58·7, 99·8 | 71·8 | 68·2, 75·3 |
| GUI-HIV | 23·5 | 19·4, 28·1 | 99·4 | 98·4, 99·8 | 95·8 | 89·7, 98·9 | 68·5 | 65·4, 71·4 |
| GUI-TBC | --- | ---, --- | --- | ---, --- | --- | ---, --- | --- | ---, --- |
| IND-BKW | 2·4 | 0·5, 7 | 99·7 | 98·5, 100 | 75 | 19·4, 99·4 | 75·9 | 71·8, 79·6 |
| IND-FSD | 50·3 | 42·1, 58·5 | 95·6 | 91·4, 98·1 | 90·6 | 82·3, 95·8 | 69·4 | 63·2, 75 |
| IND-IDU | 18·2 | 13·1, 24·3 | 99·4 | 96·8, 100 | 97·3 | 85·8, 99·9 | 51·6 | 46·1, 57·1 |
| IND-MSD | 12·2 | 7·5, 18·4 | 99·1 | 97·3, 99·8 | 86·4 | 65·1, 97·1 | 69·7 | 65·2, 73·9 |
| IND-ORA | 4·5 | 1·7, 9·6 | 95·8 | 88·3, 99·1 | 66·7 | 29·9, 92·5 | 35·2 | 28·5, 42·3 |
| IND-SDW | 58·4 | 51·8, 64·9 | 93·8 | 91·9, 95·4 | 74·2 | 67·2, 80·4 | 88·1 | 85·7, 90·3 |
| IND-UNI | 18·9 | 11·4, 28·5 | 99·4 | 98·3, 99·9 | 85 | 62·1, 96·8 | 87·4 | 84·4, 90 |
| MAL-HNW | --- | ---, --- | --- | ---, --- | --- | ---, --- | --- | ---, --- |
| MAL-HWW | 64 | 56, 71·4 | 85 | 62·1, 96·8 | 97·2 | 92, 99·4 | 22·7 | 13·8, 33·8 |
| NAM | 8·6 | 1·8, 23·1 | 99·5 | 98·1, 99·9 | 60 | 14·7, 94·7 | 92 | 88·9, 94·4 |
| SAF | 26·7 | 7·8, 55·1 | 100 | 98·6, 100 | 100 | 39·8, 100 | 96 | 93, 98 |
| USA-HIV | 11·8 | 1·5, 36·4 | 100 | 99·3, 100 | 100 | 15·8, 100 | 97·3 | 95·5, 98·5 |
| USA-IDU | 22·2 | 6·4, 47·6 | 100 | 99·3, 100 | 100 | 39·8, 100 | 97·3 | 95·5, 98·5 |
| VIE-FEM | 7·1 | 5·8, 8·4 | 99·9 | 99·7, 100 | 95·6 | 90·1, 98·6 | 70·1 | 68·8, 71·4 |
| VIE-IDU | 3·8 | 0·8, 10·8 | 99·5 | 97·5, 100 | 75 | 19·4, 99·4 | 74·4 | 69, 79·3 |
| ZAM | 43·8 | 36·1, 51·8 | 75 | 50·9, 91·3 | 93·4 | 85·3, 97·8 | 14·2 | 8·1, 22·3 |

Supplementary Table 6. Sensitivity (SENS), specificity (SPEC), positive (PPV) and negative (NPV) predictive values for a MUAC cutoff of 21·0 cm in predicting low BMI.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| MUAC ≤ 21·0 | SENS | 95 % CI | SPEC | 95 % CI | PPV | 95 % CI | NPV | 95 % CI |
| ARG | --- | ---, --- | --- | ---, --- | --- | ---, --- | --- | ---, --- |
| BAN | 14·2 | 9·6, 20 | 99·3 | 98·1, 99·9 | 90 | 73·5, 97·9 | 73·7 | 70·1, 77·1 |
| GUI-HIV | 32 | 27·4, 36·8 | 99·4 | 98·4, 99·8 | 96·9 | 92·3, 99·1 | 71 | 67·9, 73·9 |
| GUI-TBC | 3·2 | 0·1, 16·7 | 100 | 99·5, 100 | 100 | 2·5, 100 | 96·1 | 94·4, 97·3 |
| IND-BKW | 6·5 | 2·8, 12·4 | 99·7 | 98·5, 100 | 88·9 | 51·8, 99·7 | 76·6 | 72·6, 80·3 |
| IND-FSD | 66 | 57·9, 73·5 | 93·3 | 88·6, 96·5 | 89·4 | 82·2, 94·4 | 76·4 | 70·2, 81·8 |
| IND-IDU | 26·8 | 20·7, 33·5 | 99·4 | 96·8, 100 | 98·1 | 90·1, 100 | 54·4 | 48·8, 60 |
| IND-MSD | 16·7 | 11·2, 23·5 | 99·1 | 97·3, 99·8 | 89·7 | 72·6, 97·8 | 70·8 | 66·3, 75 |
| IND-ORA | 7·5 | 3·7, 13·4 | 95·8 | 88·3, 99·1 | 76·9 | 46·2, 95 | 35·9 | 29·2, 43·2 |
| IND-SDW | 65·8 | 59·3, 71·9 | 89·9 | 87·5, 91·9 | 66·4 | 59·9, 72·5 | 89·6 | 87·3, 91·7 |
| IND-UNI | 31·1 | 21·8, 41·7 | 98·4 | 96·9, 99·3 | 77·8 | 60·8, 89·9 | 89 | 86·1, 91·5 |
| MAL-HNW | --- | ---, --- | --- | ---, --- | --- | ---, --- | --- | ---, --- |
| MAL-HWW | 79·5 | 72·4, 85·5 | 70 | 45·7, 88·1 | 95·5 | 90·5, 98·3 | 29·8 | 17·3, 44·9 |
| NAM | 11·4 | 3·2, 26·7 | 98·4 | 96·5, 99·4 | 40 | 12·2, 73·8 | 92·1 | 89, 94·6 |
| SAF | 26·7 | 7·8, 55·1 | 99·6 | 97·9, 100 | 80 | 28·4, 99·5 | 96 | 92·9, 98 |
| USA-HIV | 17·6 | 3·8, 43·4 | 99·8 | 99, 100 | 75 | 19·4, 99·4 | 97·4 | 95·8, 98·6 |
| USA-IDU | 27·8 | 9·7, 53·5 | 100 | 99·3, 100 | 100 | 47·8, 100 | 97·5 | 95·7, 98·6 |
| VIE-FEM | 12·7 | 11·1, 14·4 | 99·8 | 99·5, 99·9 | 96·1 | 92·4, 98·3 | 71·4 | 70·1, 72·7 |
| VIE-IDU | 6·4 | 2·1, 14·3 | 98·6 | 96, 99·7 | 62·5 | 24·5, 91·5 | 74·7 | 69·3, 79·6 |
| ZAM | 57·4 | 49·4, 65·1 | 75 | 50·9, 91·3 | 94·9 | 88·5, 98·3 | 17·9 | 10·4, 27·7 |

Supplementary Table 7. Sensitivity (SENS), specificity (SPEC), positive (PPV) and negative (NPV) predictive values for a MUAC cutoff of 21·5 cm in predicting low BMI.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| MUAC ≤ 21·5 | SENS | 95 % CI | SPEC | 95 % CI | PPV | 95 % CI | NPV | 95 % CI |
| ARG | 0 | 0, 70·8 | 99·5 | 97·3, 100 | 0 | 0, 97·5 | 98·5 | 95·7, 99·7 |
| BAN | 22·1 | 16·4, 28·7 | 98·9 | 97·5, 99·6 | 89·4 | 76·9, 96·5 | 75·5 | 71·8, 78·8 |
| GUI-HIV | 39·1 | 34·3, 44·2 | 99·4 | 98·4, 99·8 | 97·5 | 93·6, 99·3 | 73·2 | 70·2, 76·1 |
| GUI-TBC | 3·2 | 0·1, 16·7 | 99·9 | 99·2, 100 | 50 | 1·3, 98·7 | 96·1 | 94·4, 97·3 |
| IND-BKW | 17·9 | 11·6, 25·8 | 99·7 | 98·5, 100 | 95·7 | 78·1, 99·9 | 78·9 | 74·9, 82·4 |
| IND-FSD | 73·9 | 66·1, 80·6 | 87·8 | 82·1, 92·2 | 83·7 | 76·4, 89·5 | 79·8 | 73·5, 85·2 |
| IND-IDU | 35·9 | 29·2, 43 | 99·4 | 96·8, 100 | 98·6 | 92·5, 100 | 57·7 | 51·9, 63·3 |
| IND-MSD | 22·4 | 16·2, 29·8 | 98·7 | 96·8, 99·7 | 89·7 | 75·8, 97·1 | 72·2 | 67·7, 76·3 |
| IND-ORA | 13·5 | 8·2, 20·5 | 94·4 | 86·4, 98·5 | 81·8 | 59·7, 94·8 | 37·2 | 30·1, 44·6 |
| IND-SDW | 75·8 | 69·7, 81·1 | 84·9 | 82·1, 87·4 | 60·3 | 54·5, 66 | 92 | 89·8, 93·9 |
| IND-UNI | 40 | 29·8, 50·9 | 97·2 | 95·4, 98·5 | 72 | 57·5, 83·8 | 90·2 | 87·4, 92·5 |
| MAL-HNW | --- | ---, --- | --- | ---, --- | --- | ---, --- | --- | ---, --- |
| MAL-HWW | 86·3 | 80, 91·2 | 35 | 15·4, 59·2 | 91·4 | 85·8, 95·4 | 24·1 | 10·3, 43·5 |
| NAM | 11·4 | 3·2, 26·7 | 97·8 | 95·8, 99·1 | 33·3 | 9·9, 65·1 | 92·1 | 89, 94·6 |
| SAF | 40 | 16·3, 67·7 | 99·6 | 97·9, 100 | 85·7 | 42·1, 99·6 | 96·7 | 93·8, 98·5 |
| USA-HIV | 17·6 | 3·8, 43·4 | 99·8 | 99, 100 | 75 | 19·4, 99·4 | 97·4 | 95·8, 98·6 |
| USA-IDU | 33·3 | 13·3, 59 | 100 | 99·3, 100 | 100 | 54·1, 100 | 97·7 | 95·9, 98·8 |
| VIE-FEM | 23·2 | 21·1, 25·4 | 99·3 | 98·9, 99·5 | 93·5 | 90·5, 95·7 | 73·8 | 72·5, 75·1 |
| VIE-IDU | 11·5 | 5·4, 20·8 | 98·6 | 96, 99·7 | 75 | 42·8, 94·5 | 75·8 | 70·4, 80·6 |
| ZAM | 71·6 | 64, 78·4 | 30 | 11·9, 54·3 | 89·2 | 82·6, 94 | 11·5 | 4·4, 23·4 |

Supplementary Table 8. Sensitivity (SENS), specificity (SPEC), positive (PPV) and negative (NPV) predictive values for a MUAC cutoff of 22·0 cm in predicting low BMI.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| MUAC ≤ 22·0 | SENS | 95 % CI | SPEC | 95 % CI | PPV | 95 % CI | NPV | 95 % CI |
| ARG | 0 | 0, 70·8 | 99 | 96·5, 99·9 | 0 | 0, 84·2 | 98·5 | 95·7, 99·7 |
| BAN | 32·1 | 25·5, 39·2 | 97·6 | 95·8, 98·8 | 84·7 | 74·3, 92·1 | 77·7 | 74·1, 81 |
| GUI-HIV | 48·3 | 43·3, 53·4 | 99·1 | 98, 99·7 | 96·9 | 93·4, 98·9 | 76·2 | 73·2, 79·1 |
| GUI-TBC | 3·2 | 0·1, 16·7 | 99·6 | 98·8, 99·9 | 25 | 0·6, 80·6 | 96·1 | 94·4, 97·3 |
| IND-BKW | 35 | 26·6, 44·1 | 98·4 | 96·6, 99·4 | 87·8 | 75·2, 95·4 | 82·3 | 78·5, 85·7 |
| IND-FSD | 83 | 76·1, 88·6 | 80·6 | 74, 86·1 | 78·4 | 71·3, 84·5 | 84·8 | 78·5, 89·8 |
| IND-IDU | 44·4 | 37·4, 51·7 | 98·9 | 95·9, 99·9 | 97·8 | 92·2, 99·7 | 61 | 55, 66·7 |
| IND-MSD | 34·6 | 27·2, 42·6 | 98·1 | 95·9, 99·3 | 90 | 79·5, 96·2 | 75·4 | 70·9, 79·4 |
| IND-ORA | 25·6 | 18·4, 33·8 | 93·1 | 84·5, 97·7 | 87·2 | 72·6, 95·7 | 40·4 | 32·8, 48·2 |
| IND-SDW | 84 | 78·6, 88·5 | 77·7 | 74·5, 80·6 | 53·3 | 48, 58·5 | 94·1 | 92, 95·8 |
| IND-UNI | 51·1 | 40·3, 61·8 | 94·3 | 91·9, 96·2 | 61·3 | 49·4, 72·4 | 91·6 | 88·9, 93·8 |
|  |  |  |  |  |  |  |  |  |
| MAL-HNW | --- | ---, --- | --- | ---, --- | --- | ---, --- | --- | ---, --- |
| MAL-HWW | 96·9 | 92·9, 99 | 0 | 0, 16·8 | 88·6 | 83, 92·9 | 0 | 0, 52·2 |
| NAM | 14·3 | 4·8, 30·3 | 97·3 | 95·1, 98·7 | 33·3 | 11·8, 61·6 | 92·3 | 89·2, 94·7 |
| SAF | 40 | 16·3, 67·7 | 99·6 | 97·9, 100 | 85·7 | 42·1, 99·6 | 96·7 | 93·8, 98·5 |
| USA-HIV | 35·3 | 14·2, 61·7 | 99·3 | 98·1, 99·8 | 60 | 26·2, 87·8 | 98 | 96·4, 99 |
| USA-IDU | 38·9 | 17·3, 64·3 | 99·8 | 98·9, 100 | 87·5 | 47·3, 99·7 | 97·8 | 96·2, 98·9 |
| VIE-FEM | 36·4 | 34, 38·9 | 98·3 | 97·8, 98·7 | 90·8 | 88·3, 93 | 77·2 | 75·9, 78·4 |
| VIE-IDU | 26·9 | 17·5, 38·2 | 97·3 | 94·1, 99 | 77·8 | 57·7, 91·4 | 78·9 | 73·5, 83·6 |
| ZAM | 90·1 | 84·5, 94·2 | 10 | 1·2, 31·7 | 89 | 83·2, 93·4 | 11·1 | 1·4, 34·7 |

Supplementary Table 9. Sensitivity (SENS), specificity (SPEC), positive (PPV) and negative (NPV) predictive values for a MUAC cutoff of 22·5 cm in predicting low BMI.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | |  | |  | |  | |
| MUAC ≤ 22·5 | SENS | 95 % CI | SPEC | 95 % CI | PPV | 95 % CI | NPV | 95 % CI |
| ARG | 33·3 | 0·8, 90·6 | 99 | 96·5, 99·9 | 33·3 | 0·8, 90·6 | 99 | 96·5, 99·9 |
| BAN | 43·7 | 36·5, 51·1 | 96·1 | 93·9, 97·7 | 82·2 | 73·3, 89·1 | 80·5 | 76·9, 83·7 |
| GUI-HIV | 50·1 | 45·1, 55·2 | 98·9 | 97·8, 99·6 | 96·6 | 93, 98·6 | 76·8 | 73·8, 79·7 |
| GUI-TBC | 6·5 | 0·8, 21·4 | 99·3 | 98·4, 99·8 | 28·6 | 3·7, 71 | 96·2 | 94·6, 97·4 |
| IND-BKW | 50·4 | 41·2, 59·5 | 95 | 92·3, 96·9 | 76·5 | 65·8, 85·2 | 85·5 | 81·7, 88·7 |
| IND-FSD | 89·5 | 83·6, 93·9 | 73·9 | 66·8, 80·1 | 74·5 | 67·5, 80·6 | 89·3 | 83·1, 93·7 |
| IND-IDU | 51·5 | 44·3, 58·7 | 97·7 | 94·2, 99·4 | 96·2 | 90·6, 99 | 63·9 | 57·8, 69·7 |
| IND-MSD | 47·4 | 39·4, 55·6 | 96·9 | 94·3, 98·5 | 88·1 | 79·2, 94·1 | 79 | 74·6, 82·9 |
| IND-ORA | 35·3 | 27·3, 44·1 | 91·7 | 82·7, 96·9 | 88·7 | 77, 95·7 | 43·4 | 35·4, 51·7 |
| IND-SDW | 90·5 | 85·9, 93·9 | 70·6 | 67·2, 73·8 | 48·3 | 43·5, 53·1 | 96·1 | 94·1, 97·5 |
| IND-UNI | 63·3 | 52·5, 73·2 | 89·4 | 86·4, 91·9 | 51·4 | 41·7, 61 | 93·2 | 90·6, 95·3 |
| MAL-HNW | 0 | 0, 97·5 | 99·7 | 98·3, 100 | 0 | 0, 97·5 | 99·7 | 98·3, 100 |
| MAL-HWW | 99·4 | 96·6, 100 | 0 | 0, 16·8 | 88·9 | 83·4, 93·1 | 0 | 0, 97·5 |
| NAM | 17·1 | 6·6, 33·6 | 97 | 94·7, 98·5 | 35·3 | 14·2, 61·7 | 92·5 | 89·4, 94·9 |
| SAF | 40 | 16·3, 67·7 | 98·9 | 96·7, 99·8 | 66·7 | 29·9, 92·5 | 96·7 | 93·8, 98·5 |
| USA-HIV | 58·8 | 32·9, 81·6 | 99·1 | 97·8, 99·7 | 66·7 | 38·4, 88·2 | 98·7 | 97·3, 99·5 |
| USA-IDU | 61·1 | 35·7, 82·7 | 99·6 | 98·6, 100 | 84·6 | 54·6, 98·1 | 98·6 | 97·2, 99·4 |
| VIE-FEM | 51·7 | 49·2, 54·2 | 95·5 | 94·7, 96·2 | 84 | 81·5, 86·3 | 81·2 | 80, 82·4 |
| VIE-IDU | 38·5 | 27·7, 50·2 | 96·8 | 93·5, 98·7 | 81·1 | 64·8, 92 | 81·5 | 76·3, 86·1 |
| ZAM | 98·8 | 95·6, 99·9 | 0 | 0, 16·8 | 88·9 | 83·4, 93·1 | 0 | 0, 84·2 |

Supplementary Table 10. Sensitivity (SENS), specificity (SPEC), positive (PPV) and negative (NPV) predictive values for a MUAC cutoff of 23·0 cm in predicting low BMI.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | |  | |  | |  | |
| MUAC ≤ 23·0 | SENS | 95 % CI | SPEC | 95 % CI | PPV | 95 % CI | NPV | 95 % CI |
| ARG | 33·3 | 0·8, 90·6 | 97 | 93·6, 98·9 | 14·3 | 0·4, 57·9 | 99 | 96·4, 99·9 |
| BAN | 57·9 | 50·5, 65 | 92·2 | 89·3, 94·5 | 75·3 | 67·5, 82·1 | 84·1 | 80·6, 87·2 |
| GUI-HIV | 60·9 | 55·8, 65·7 | 97·9 | 96·4, 98·8 | 94·4 | 90·9, 96·9 | 80·7 | 77·8, 83·4 |
| GUI-TBC | 12·9 | 3·6, 29·8 | 99·2 | 98·2, 99·7 | 40 | 12·2, 73·8 | 96·4 | 94·8, 97·6 |
| IND-BKW | 69·1 | 60·1, 77·1 | 89·9 | 86·5, 92·8 | 69·1 | 60·1, 77·1 | 89·9 | 86·5, 92·8 |
| IND-FSD | 95·4 | 90·8, 98·1 | 66·7 | 59·3, 73·5 | 70·9 | 64·2, 77 | 94·5 | 89, 97·8 |
| IND-IDU | 63·6 | 56·5, 70·3 | 96 | 91·9, 98·4 | 94·7 | 89·5, 97·9 | 69·9 | 63·6, 75·6 |
| IND-MSD | 61·5 | 53·4, 69·2 | 94·3 | 91·2, 96·6 | 84·2 | 76·2, 90·4 | 83·3 | 79·1, 87 |
| IND-ORA | 51·1 | 42·3, 59·9 | 88·9 | 79·3, 95·1 | 89·5 | 80·3, 95·3 | 49·6 | 40·7, 58·5 |
| IND-SDW | 95·2 | 91·6, 97·6 | 62·9 | 59·4, 66·4 | 43·8 | 39·4, 48·3 | 97·8 | 96, 98·9 |
| IND-UNI | 74·4 | 64·2, 83·1 | 82·9 | 79·4, 86·1 | 43·5 | 35·5, 51·7 | 94·8 | 92·3, 96·7 |
| MAL-HNW | 0 | 0, 97·5 | 98·8 | 96·9, 99·7 | 0 | 0, 60·2 | 99·7 | 98·3, 100 |
|  |  |  |  |  |  |  |  |  |
| MAL-HWW | --- | ---, --- | --- | ---, --- | --- | ---, --- | --- | ---, --- |
| NAM | 20 | 8·4, 36·9 | 95·9 | 93·4, 97·7 | 31·8 | 13·9, 54·9 | 92·7 | 89·6, 95·1 |
| SAF | 46·7 | 21·3, 73·4 | 98·1 | 95·6, 99·4 | 58·3 | 27·7, 84·8 | 97 | 94·2, 98·7 |
| USA-HIV | 64·7 | 38·3, 85·8 | 97·9 | 96·4, 99 | 50 | 28·2, 71·8 | 98·9 | 97·6, 99·6 |
| USA-IDU | 61·1 | 35·7, 82·7 | 99 | 97·7, 99·7 | 68·8 | 41·3, 89 | 98·6 | 97·2, 99·4 |
| VIE-FEM | 66·3 | 63·9, 68·6 | 91·5 | 90·5, 92·4 | 78·1 | 75·8, 80·3 | 85·6 | 84·4, 86·7 |
| VIE-IDU | 53·8 | 42·2, 65·2 | 93·2 | 89, 96·1 | 73·7 | 60·3, 84·5 | 85 | 79·8, 89·3 |
| ZAM | 99·4 | 96·6, 100 | 0 | 0, 16·8 | 89 | 83·5, 93·1 | 0 | 0, 97·5 |

Supplementary Table 11. Sensitivity (SENS), specificity (SPEC), positive (PPV) and negative (NPV) predictive values for a MUAC cutoff of 23·5 cm in predicting low BMI.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| MUAC ≤ 23·5 | SENS | 95 % CI | SPEC | 95 % CI | PPV | 95 % CI | NPV | 95 % CI |
| ARG | 100 | 29·2, 100 | 97 | 93·6, 98·9 | 33·3 | 7·5, 70·1 | 100 | 98·1, 100 |
| BAN | 66·8 | 59·7, 73·5 | 88·7 | 85·4, 91·4 | 70·9 | 63·7, 77·5 | 86·6 | 83·2, 89·6 |
| GUI-HIV | 69·3 | 64·5, 73·8 | 96·2 | 94·4, 97·5 | 91·6 | 87·8, 94·5 | 84 | 81·2, 86·5 |
| GUI-TBC | 22·6 | 9·6, 41·1 | 98·4 | 97·2, 99·2 | 36·8 | 16·3, 61·6 | 96·8 | 95·3, 97·9 |
| IND-BKW | 82·1 | 74·2, 88·4 | 82·8 | 78·6, 86·5 | 60·8 | 53, 68·3 | 93·4 | 90·2, 95·8 |
| IND-FSD | 97·4 | 93·4, 99·3 | 57·2 | 49·6, 64·6 | 65·9 | 59·4, 72·1 | 96·3 | 90·7, 99 |
| IND-IDU | 73·2 | 66·5, 79·3 | 93·1 | 88·3, 96·4 | 92·4 | 87, 96 | 75·3 | 69, 81 |
| IND-MSD | 75 | 67·4, 81·6 | 88·7 | 84·7, 91·9 | 76·5 | 68·9, 82·9 | 87·9 | 83·8, 91·2 |
| IND-ORA | 66·2 | 57·5, 74·1 | 76·4 | 64·9, 85·6 | 83·8 | 75·3, 90·3 | 55 | 44·7, 65 |
| IND-SDW | 95·2 | 91·6, 97·6 | 55·1 | 51·4, 58·6 | 39·1 | 35·1, 43·3 | 97·4 | 95·5, 98·7 |
| IND-UNI | 83·3 | 74, 90·4 | 74·1 | 70, 77·8 | 36·2 | 29·7, 43·2 | 96·2 | 93·8, 97·8 |
| MAL-HNW | 100 | 2·5, 100 | 93·9 | 90·7, 96·2 | 4·8 | 0·1, 23·8 | 100 | 98·8, 100 |
| MAL-HWW | --- | ---, --- | --- | ---, --- | --- | ---, --- | --- | ---, --- |
| NAM | 28·6 | 14·6, 46·3 | 93·2 | 90·2, 95·6 | 28·6 | 14·6, 46·3 | 93·2 | 90·2, 95·6 |
| SAF | 53·3 | 26·6, 78·7 | 97·3 | 94·6, 98·9 | 53·3 | 26·6, 78·7 | 97·3 | 94·6, 98·9 |
| USA-HIV | 64·7 | 38·3, 85·8 | 97·2 | 95·4, 98·4 | 42·3 | 23·4, 63·1 | 98·9 | 97·5, 99·6 |
| USA-IDU | 61·1 | 35·7, 82·7 | 98·8 | 97·4, 99·6 | 64·7 | 38·3, 85·8 | 98·6 | 97·1, 99·4 |
| VIE-FEM | 80·1 | 78, 82 | 83·5 | 82·2, 84·8 | 69 | 66·8, 71·1 | 90·2 | 89·1, 91·2 |
| VIE-IDU | 64·1 | 52·4, 74·7 | 89·5 | 84·7, 93·2 | 68·5 | 56·6, 78·9 | 87·5 | 82·4, 91·5 |
| ZAM | 99·4 | 96·6, 100 | 0 | 0, 16·8 | 89 | 83·5, 93·1 | 0 | 0, 97·5 |

Supplementary Table 12. Sensitivity (SENS), specificity (SPEC), positive (PPV) and negative (NPV) predictive values for a MUAC cutoff of 24·0 cm in predicting low BMI.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | |  | |  | |  | |
| MUAC ≤ 24·0 | SENS | 95 % CI | SPEC | 95 % CI | PPV | 95 % CI | NPV | 95 % CI |
| ARG | 100 | 29·2, 100 | 92·5 | 88, 95·8 | 16·7 | 3·6, 41·4 | 100 | 98, 100 |
| BAN | 79·5 | 73, 85 | 81·7 | 77·9, 85·2 | 64·3 | 57·8, 70·4 | 90·6 | 87·4, 93·2 |
| GUI-HIV | 78 | 73·6, 82 | 93 | 90·7, 94·8 | 86·9 | 82·9, 90·2 | 87·6 | 84·9, 90 |
| GUI-TBC | 41·9 | 24·5, 60·9 | 97 | 95·5, 98·1 | 37·1 | 21·5, 55·1 | 97·5 | 96·1, 98·5 |
| IND-BKW | 94·3 | 88·6, 97·7 | 72 | 67·1, 76·4 | 52·3 | 45·5, 59 | 97·5 | 94·9, 99 |
| IND-FSD | 98·7 | 95·4, 99·8 | 47·8 | 40·3, 55·3 | 61·6 | 55·2, 67·8 | 97·7 | 92, 99·7 |
| IND-IDU | 80·8 | 74·6, 86 | 83·9 | 77·6, 89 | 85·1 | 79·2, 89·9 | 79·3 | 72·8, 85 |
| IND-MSD | 84·6 | 78, 89·9 | 84·9 | 80·5, 88·7 | 73·3 | 66·2, 79·6 | 91·8 | 88·1, 94·7 |
| IND-ORA | 73·7 | 65·3, 80·9 | 69·4 | 57·5, 79·8 | 81·7 | 73·6, 88·1 | 58·8 | 47·6, 69·4 |
| IND-SDW | 97 | 93·9, 98·8 | 46·5 | 42·9, 50·1 | 35·5 | 31·8, 39·4 | 98·1 | 96, 99·2 |
| IND-UNI | 83·3 | 74, 90·4 | 70·1 | 66, 74·1 | 33 | 27, 39·6 | 96 | 93·4, 97·7 |
| MAL-HNW | 100 | 2·5, 100 | 88·7 | 84·8, 91·9 | 2·6 | 0·1, 13·8 | 100 | 98·7, 100 |
| MAL-HWW | --- | ---, --- | --- | ---, --- | --- | ---, --- | --- | ---, --- |
| NAM | 40 | 23·9, 57·9 | 90 | 86·4, 92·8 | 27·5 | 15·9, 41·7 | 94·1 | 91, 96·3 |
| SAF | 73·3 | 44·9, 92·2 | 96·2 | 93·1, 98·2 | 52·4 | 29·8, 74·3 | 98·4 | 96·1, 99·6 |
| USA-HIV | 76·5 | 50·1, 93·2 | 96·8 | 95, 98·1 | 43·3 | 25·5, 62·6 | 99·2 | 98·1, 99·8 |
| USA-IDU | 77·8 | 52·4, 93·6 | 97·4 | 95·6, 98·6 | 51·9 | 31·9, 71·3 | 99·2 | 97·9, 99·8 |
| VIE-FEM | 89·4 | 87·8, 90·9 | 74·5 | 73, 76 | 61·6 | 59·6, 63·7 | 93·9 | 92·9, 94·8 |
| VIE-IDU | 74·4 | 63·2, 83·6 | 82·6 | 77, 87·4 | 60·4 | 49·9, 70·3 | 90 | 85·1, 93·8 |
| ZAM | 99·4 | 96·6, 100 | 0 | 0, 16·8 | 89 | 83·5, 93·1 | 0 | 0, 97·5 |

Supplementary Table 13. Sensitivity (SENS), specificity (SPEC), positive (PPV) and negative (NPV) predictive values for a MUAC cutoff of 24·5 cm in predicting low BMI.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| MUAC ≤ 24·5 | SENS | 95 % CI | SPEC | 95 % CI | PPV | 95 % CI | NPV | 95 % CI |
| ARG | 100 | 29·2, 100 | 89·6 | 84·5, 93·4 | 12·5 | 2·7, 32·4 | 100 | 98, 100 |
| BAN | 84·2 | 78·2, 89·1 | 75·7 | 71·5, 79·5 | 58·8 | 52·7, 64·7 | 92·1 | 88·9, 94·6 |
| GUI-HIV | 86·4 | 82·6, 89·7 | 88·7 | 86, 91 | 82 | 78, 85·6 | 91·6 | 89·2, 93·7 |
| GUI-TBC | 45·2 | 27·3, 64 | 95·6 | 93·9, 97 | 30·4 | 17·7, 45·8 | 97·6 | 96·2, 98·6 |
| IND-BKW | 99·2 | 95·6, 100 | 60·8 | 55·7, 65·8 | 45·2 | 39·1, 51·3 | 99·6 | 97·6, 100 |
| IND-FSD | 99·3 | 96·4, 100 | 41·7 | 34·4, 49·2 | 59·1 | 52·9, 65·2 | 98·7 | 92·9, 100 |
| IND-IDU | 85·4 | 79·6, 90 | 82·2 | 75·7, 87·6 | 84·5 | 78·7, 89·2 | 83·1 | 76·7, 88·4 |
| IND-MSD | 91 | 85·4, 95 | 78 | 73, 82·4 | 67 | 60·2, 73·3 | 94·7 | 91·2, 97 |
| IND-ORA | 84·2 | 76·9, 90 | 51·4 | 39·3, 63·3 | 76·2 | 68·5, 82·8 | 63·8 | 50·1, 76 |
| IND-SDW | 97·8 | 95, 99·3 | 40·2 | 36·7, 43·8 | 33·2 | 29·7, 36·9 | 98·4 | 96·3, 99·5 |
| IND-UNI | 87·8 | 79·2, 93·7 | 59·3 | 54·9, 63·6 | 27·6 | 22·5, 33·2 | 96·5 | 93·8, 98·2 |
| MAL-HNW | 100 | 2·5, 100 | 84·1 | 79·7, 87·9 | 1·9 | 0, 10·1 | 100 | 98·7, 100 |
| MAL-HWW | --- | ---, --- | --- | ---, --- | --- | ---, --- | --- | ---, --- |
| NAM | 48·6 | 31·4, 66 | 84·8 | 80·7, 88·3 | 23·3 | 14·2, 34·6 | 94·6 | 91·5, 96·7 |
| SAF | 80 | 51·9, 95·7 | 94·7 | 91·3, 97·1 | 46·2 | 26·6, 66·6 | 98·8 | 96·6, 99·8 |
| USA-HIV | 88·2 | 63·6, 98·5 | 96·1 | 94·1, 97·6 | 41·7 | 25·5, 59·2 | 99·6 | 98·6, 100 |
| USA-IDU | 83·3 | 58·6, 96·4 | 96·4 | 94·4, 97·9 | 45·5 | 28·1, 63·6 | 99·4 | 98·2, 99·9 |
| VIE-FEM | 95·4 | 94·2, 96·4 | 63·4 | 61·8, 65·1 | 54·4 | 52·5, 56·3 | 96·8 | 96, 97·5 |
| VIE-IDU | 82·1 | 71·7, 89·8 | 78·5 | 72·5, 83·8 | 57·7 | 47·9, 67 | 92·5 | 87·7, 95·8 |
| ZAM | 99·4 | 96·6, 100 | 0 | 0, 16·8 | 89 | 83·5, 93·1 | 0 | 0, 97·5 |

Supplementary Table 14. Sensitivity (SENS), specificity (SPEC), positive (PPV) and negative (NPV) predictive values for a MUAC cutoff of 25·0 cm in predicting low BMI.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| MUAC ≤ 25·0 | SENS | 95 % CI | SPEC | 95 % CI | PPV | 95 % CI | NPV | 95 % CI |
| ARG | 100 | 29·2, 100 | 85·1 | 79·4, 89·7 | 9·1 | 1·9, 24·3 | 100 | 97·9, 100 |
| BAN | 95·3 | 91·2, 97·8 | 67 | 62·5, 71·2 | 54·4 | 48·8, 59·8 | 97·2 | 94·7, 98·7 |
| GUI-HIV | 91·3 | 88·1, 93·9 | 82·4 | 79·3, 85·3 | 75·6 | 71·5, 79·4 | 94·1 | 91·8, 95·9 |
| GUI-TBC | 58·1 | 39·1, 75·5 | 92·9 | 90·8, 94·7 | 25·7 | 16·0, 37·6 | 98·1 | 96·8, 99 |
| IND-BKW | 100 | 97, 100 | 46 | 40·9, 51·2 | 37·6 | 32·3, 43·1 | 100 | 97·9, 100 |
| IND-FSD | 99·3 | 96·4, 100 | 33·3 | 26·5, 40·7 | 55·9 | 49·8, 61·9 | 98·4 | 91·2, 100 |
| IND-IDU | 90·4 | 85·4, 94·1 | 74·7 | 67·6, 81 | 80·3 | 74·4, 85·3 | 87·2 | 80·8, 92·1 |
| IND-MSD | 94·2 | 89·3, 97·3 | 69·5 | 64·1, 74·5 | 60·2 | 53·8, 66·4 | 96·1 | 92·7, 98·2 |
| IND-ORA | 90·2 | 83·9, 94·7 | 40·3 | 28·9, 52·5 | 73·6 | 66·2, 80·2 | 69 | 52·9, 82·4 |
| IND-SDW | 98·3 | 95·6, 99·5 | 33·9 | 30·5, 37·4 | 31·1 | 27·8, 34·6 | 98·5 | 96·1, 99·6 |
| IND-UNI | 91·1 | 83·2, 96·1 | 50·7 | 46·3, 55·1 | 24·6 | 20·1, 29·6 | 97 | 94·2, 98·7 |
| MAL-HNW | 100 | 2·5, 100 | 72·6 | 67·4, 77·3 | 1·1 | 0·0, 6·0 | 100 | 98·5, 100 |
| MAL-HWW | --- | ---, --- | --- | ---, --- | --- | ---, --- | --- | ---, --- |
| NAM | 60 | 42·1, 76·1 | 80·2 | 75·8, 84·2 | 22·3 | 14·4, 32·1 | 95·5 | 92·5, 97·5 |
| SAF | 93·3 | 68·1, 99·8 | 92·8 | 89, 95·6 | 42·4 | 25·5, 60·8 | 99·6 | 97·8, 100 |
| USA-HIV | 94·1 | 71·3, 99·9 | 94·6 | 92·3, 96·3 | 35·6 | 21·9, 51·2 | 99·8 | 98·9, 100 |
| USA-IDU | 83·3 | 58·6, 96·4 | 94·6 | 92·3, 96·4 | 35·7 | 21·6, 52·0 | 99·4 | 98·2, 99·9 |
| VIE-FEM | 97·7 | 96·9, 98·4 | 52·6 | 50·9, 54·3 | 48·5 | 46·8, 50·3 | 98·1 | 97·3, 98·6 |
| VIE-IDU | 89·7 | 80·8, 95·5 | 68·5 | 61·9, 74·6 | 50·4 | 41·8, 58·9 | 94·9 | 90·3, 97·8 |
| ZAM | --- | ---, --- | --- | ---, --- | --- | ---, --- | --- | ---, --- |

Supplementary Table 15. Sensitivity (SENS), specificity (SPEC), positive (PPV) and negative (NPV) predictive values for a MUAC cutoff of 25·5 cm in predicting low BMI.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| MUAC ≤ 25·5 | SENS | 95 % CI | SPEC | 95 % CI | PPV | 95 % CI | NPV | 95 % CI |
| ARG | 100 | 29·2, 100 | 83·6 | 77·7, 88·4 | 8·3 | 1·8, 22·5 | 100 | 97·8, 100 |
| BAN | 97·9 | 94·7, 99·4 | 60·7 | 56, 65·1 | 50·7 | 45·4, 55·9 | 98·6 | 96·4, 99·6 |
| GUI-HIV | 91·6 | 88·4, 94·1 | 81·2 | 78, 84·1 | 74·4 | 70·3, 78·3 | 94·1 | 91·9, 95·9 |
| GUI-TBC | 71 | 52, 85·8 | 89·7 | 87·2, 91·8 | 22·4 | 14·6, 32 | 98·7 | 97·5, 99·4 |
| IND-BKW | 100 | 97, 100 | 35·4 | 30·6, 40·5 | 33·5 | 28·7, 38·6 | 100 | 97·3, 100 |
| IND-FSD | 99·3 | 96·4, 100 | 32·2 | 25·5, 39·6 | 55·5 | 49·4, 61·5 | 98·3 | 90·9, 100 |
| IND-IDU | 93·4 | 89, 96·5 | 62·6 | 55, 69·8 | 74 | 68·1, 79·3 | 89·3 | 82·5, 94·2 |
| IND-MSD | 98·1 | 94·5, 99·6 | 60·1 | 54·4, 65·5 | 54·6 | 48·6, 60·6 | 98·5 | 95·5, 99·7 |
| IND-ORA | 96·2 | 91·4, 98·8 | 29·2 | 19, 41·1 | 71·5 | 64·3, 78 | 80·8 | 60·6, 93·4 |
| IND-SDW | 98·3 | 95·6, 99·5 | 28·4 | 25·2, 31·7 | 29·4 | 26·2, 32·8 | 98·2 | 95·4, 99·5 |
| IND-UNI | 94·4 | 87·5, 98·2 | 42 | 37·7, 46·5 | 22·4 | 18·3, 26·9 | 97·7 | 94·8, 99·3 |
| MAL-HNW | 100 | 2·5, 100 | 65·5 | 60·1, 70·7 | 0·9 | 0, 4·8 | 100 | 98·3, 100 |
| MAL-HWW | --- | ---, --- | --- | ---, --- | --- | ---, --- | --- | ---, --- |
| NAM | 62·9 | 44·9, 78·5 | 75·1 | 70·3, 79·4 | 19·3 | 12·5, 27·7 | 95·5 | 92·5, 97·6 |
| SAF | 93·3 | 68·1, 99·8 | 90·5 | 86·3, 93·8 | 35·9 | 21·2, 52·8 | 99·6 | 97·7, 100 |
| USA-HIV | 100 | 80·5, 100 | 93·3 | 90·8, 95·3 | 32·1 | 19·9, 46·3 | 100 | 99·3, 100 |
| USA-IDU | 88·9 | 65·3, 98·6 | 93·4 | 90·9, 95·4 | 32·7 | 19·9, 47·5 | 99·6 | 98·5, 99·9 |
| VIE-FEM | 99·1 | 98·5, 99·5 | 41·5 | 39·8, 43·1 | 43·7 | 42, 45·3 | 99 | 98·3, 99·5 |
| VIE-IDU | 94·9 | 87·4, 98·6 | 60·3 | 53·5, 66·8 | 46 | 38·1, 54 | 97·1 | 92·6, 99·2 |
| ZAM | --- | ---, --- | --- | ---, --- | --- | ---, --- | --- | ---, --- |

Supplementary Table 16. Sensitivity (SENS), specificity (SPEC), positive (PPV) and negative (NPV) predictive values for a MUAC cutoff of 26·0 cm in predicting low BMI.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| MUAC ≤ 26·0 | SENS | 95 % CI | SPEC | 95 % CI | PPV | 95 % CI | NPV | 95 % CI |
| ARG | 100 | 29·2, 100 | 80·1 | 73·9, 85·4 | 7 | 1·5, 19·1 | 100 | 97·7, 100 |
| BAN | 100 | 98·1, 100 | 52·2 | 47·5, 56·8 | 46·3 | 41·4, 51·3 | 100 | 98·5, 100 |
| GUI-HIV | 95·4 | 92·8, 97·2 | 73·4 | 69·8, 76·7 | 68·2 | 64·1, 72·1 | 96·4 | 94·3, 97·8 |
| GUI-TBC | 74·2 | 55·4, 88·1 | 86·1 | 83·4, 88·5 | 18·4 | 12, 26·3 | 98·8 | 97·6, 99·5 |
| IND-BKW | 100 | 97, 100 | 27·5 | 23·1, 32·3 | 31 | 26·5, 35·8 | 100 | 96·5, 100 |
| IND-FSD | 99·3 | 96·4, 100 | 26·1 | 19·9, 33·2 | 53·3 | 47·4, 59·2 | 97·9 | 88·9, 99·9 |
| IND-IDU | 97·5 | 94·2, 99·2 | 53·4 | 45·7, 61 | 70·4 | 64·7, 75·8 | 94·9 | 88·5, 98·3 |
| IND-MSD | 98·1 | 94·5, 99·6 | 47·5 | 41·9, 53·1 | 47·8 | 42·2, 53·4 | 98·1 | 94·4, 99·6 |
| IND-ORA | 99·2 | 95·9, 100 | 19·4 | 11·1, 30·5 | 69·5 | 62·4, 75·9 | 93·3 | 68·1, 99·8 |
| IND-SDW | 98·3 | 95·6, 99·5 | 24·6 | 21·6, 27·8 | 28·3 | 25·2, 31·6 | 97·9 | 94·7, 99·4 |
| IND-UNI | 95·6 | 89, 98·8 | 34·6 | 30·4, 38·9 | 20·5 | 16·8, 24·7 | 97·8 | 94·4, 99·4 |
| MAL-HNW | 100 | 2·5, 100 | 56·4 | 50·8, 61·8 | 0·7 | 0, 3·8 | 100 | 98, 100 |
| MAL-HWW | --- | ---, --- | --- | ---, --- | --- | ---, --- | --- | ---, --- |
| NAM | 71·4 | 53·7, 85·4 | 69·4 | 64·4, 74 | 18·1 | 12·1, 25·6 | 96·2 | 93·2, 98·2 |
| SAF | 93·3 | 68·1, 99·8 | 89 | 84·6, 92·5 | 32·6 | 19·1, 48·5 | 99·6 | 97·7, 100 |
| USA-HIV | 100 | 80·5, 100 | 91·2 | 88·5, 93·5 | 26·6 | 16·3, 39·1 | 100 | 99·2, 100 |
| USA-IDU | 88·9 | 65·3, 98·6 | 91 | 88·2, 93·4 | 26·2 | 15·8, 39·1 | 99·6 | 98·4, 99·9 |
| VIE-FEM | 99·8 | 99·4, 100 | 32·3 | 30·7, 33·9 | 40·3 | 38·7, 41·9 | 99·7 | 99·2, 99·9 |
| VIE-IDU | 96·2 | 89·2, 99·2 | 49·3 | 42·5, 56·1 | 40·3 | 33·2, 47·7 | 97·3 | 92·3, 99·4 |
| ZAM | --- | ---, --- | --- | ---, --- | --- | ---, --- | --- | ---, --- |

Supplementary Table 17. Sensitivity (SENS), specificity (SPEC), positive (PPV) and negative (NPV) predictive values for a MUAC cutoff of 26·5 cm in predicting low BMI.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| MUAC ≤ 26·5 | SENS | 95 % CI | SPEC | 95 % CI | PPV | 95 % CI | NPV | 95 % CI |
| ARG | 100 | 29·2, 100 | 70·6 | 63·8, 76·8 | 4·8 | 1, 13·5 | 100 | 97·4, 100 |
| BAN | 100 | 98·1, 100 | 45·4 | 40·8, 50·1 | 43·1 | 38·4, 47·9 | 100 | 98·3, 100 |
| GUI-HIV | 97·7 | 95·7, 98·9 | 66·1 | 62·3, 69·7 | 63·2 | 59·3, 67·1 | 98 | 96·2, 99·1 |
| GUI-TBC | 80·6 | 62·5, 92·5 | 82·2 | 79·2, 84·9 | 16 | 10·6, 22·7 | 99 | 97·9, 99·6 |
| IND-BKW | 100 | 97, 100 | 19·8 | 15·9, 24·2 | 28·9 | 24·6, 33·4 | 100 | 95·2, 100 |
| IND-FSD | 99·3 | 96·4, 100 | 22·2 | 16·4, 29 | 52·1 | 46·2, 57·9 | 97·6 | 87·1, 99·9 |
| IND-IDU | 98 | 94·9, 99·4 | 45·4 | 37·9, 53·1 | 67·1 | 61·4, 72·5 | 95·2 | 88·1, 98·7 |
| IND-MSD | 98·7 | 95·4, 99·8 | 38·4 | 33, 44 | 44 | 38·7, 49·4 | 98·4 | 94·3, 99·8 |
| IND-ORA | 99·2 | 95·9, 100 | 15·3 | 7·9, 25·7 | 68·4 | 61·3, 74·9 | 91·7 | 61·5, 99·8 |
| IND-SDW | 98·3 | 95·6, 99·5 | 20 | 17·2, 23 | 27·2 | 24·2, 30·3 | 97·4 | 93·6, 99·3 |
| IND-UNI | 97·8 | 92·2, 99·7 | 29·1 | 25·2, 33·2 | 19·6 | 16, 23·6 | 98·7 | 95·3, 99·8 |
| MAL-HNW | 100 | 2·5, 100 | 49·7 | 44·2, 55·2 | 0·6 | 0, 3·3 | 100 | 97·8, 100 |
| MAL-HWW | --- | ---, --- | --- | ---, --- | --- | ---, --- | --- | ---, --- |
| NAM | 77·1 | 59·9, 89·6 | 63·4 | 58·3, 68·3 | 16·7 | 11·3, 23·3 | 96·7 | 93·6, 98·6 |
| SAF | 93·3 | 68·1, 99·8 | 86·7 | 82, 90·6 | 28·6 | 16·6, 43·3 | 99·6 | 97·6, 100 |
| USA-HIV | 100 | 80·5, 100 | 88·4 | 85·4, 91 | 21·5 | 13·1, 32·2 | 100 | 99·2, 100 |
| USA-IDU | 88·9 | 65·3, 98·6 | 88 | 84·9, 90·7 | 21·1 | 12·5, 31·9 | 99·5 | 98·4, 99·9 |
| VIE-FEM | 99·8 | 99·4, 100 | 24·3 | 22·9, 25·8 | 37·6 | 36·2, 39·1 | 99·6 | 98·9, 99·9 |
| VIE-IDU | 96·2 | 89·2, 99·2 | 43·4 | 36·7, 50·2 | 37·7 | 30·9, 44·8 | 96·9 | 91·3, 99·4 |
|  |  |  |  |  |  |  |  |  |
| ZAM | --- | ---, --- | --- | ---, --- | --- | ---, --- | --- | ---, --- |

Supplementary Table 18. Summary Estimates of SENS, SPEC, LR+ and LR- at selected MUAC cutoffs for all studies combined, excluding nine studiesa with low prevalence of BMI < 18·5 or BMI ≥ 18·5 kg/m2

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| MUAC (cm) | SENS | 95 % CI | SPEC | 95 % CI | LR+ | 95 % CI | LR- | 95 % CI | # Studies |
| ≤19·0 | 4·1 | 1·6, 10·1 | 99·7 | 99·2, 99·9 | 13·1 | 4·2, 41·1 | 1 | 0·9, 1 | 10 |
| ≤19·5 | 6·9 | 3·3, 13·9 | 99·6 | 99, 99·9 | 19·1 | 8·3, 43·7 | 0·9 | 0·9, 1 | 10 |
| ≤20·0 | 8·7 | 4, 17·9 | 99·7 | 99, 99·9 | 27·9 | 10·6, 73·7 | 0·9 | 0·9, 1 | 11 |
| ≤20·5 | 13·7 | 7·2, 24·5 | 99·4 | 98·7, 99·8 | 24·4 | 16·2, 36·9 | 0·9 | 0·8, 1 | 11 |
| ≤21·0 | 21·9 | 12·6, 35·3 | 98·9 | 97·6, 99·5 | 19·9 | 11·6, 34 | 0·8 | 0·7, 0·9 | 11 |
| ≤21·5 | 32·4 | 20·9, 46·4 | 98·3 | 96·4, 99·2 | 18·8 | 11·2, 31·4 | 0·7 | 0·6, 0·8 | 11 |
| ≤22·0 | 46·7 | 34, 59·7 | 96·6 | 93·7, 98·2 | 13·9 | 8·9, 21·6 | 0·6 | 0·4, 0·7 | 11 |
| ≤22·5 | 46·7 | 34, 59·7 | 96·6 | 93·7, 98·2 | 13·9 | 8·9, 21·6 | 0·6 | 0·4, 0·7 | 11 |
| ≤23·0 | 72·1 | 59·5, 82·1 | 90·2 | 84·2, 94·1 | 7·4 | 5·1, 10·6 | 0·3 | 0·2, 0·4 | 11 |
| ≤23·5 | 80·7 | 71·5, 87·4 | 83·8 | 75·6, 89·6 | 5 | 3·5, 7·1 | 0·2 | 0·2, 0·3 | 11 |
| ≤24·0 | 87·8 | 80·7, 92·5 | 76 | 66·8, 83·2 | 3·7 | 2·7, 4·9 | 0·2 | 0·1, 0·2 | 11 |
| ≤24·5 | 92·8 | 87·5, 96 | 67·6 | 57·2, 76·5 | 2·9 | 2·2, 3·8 | 0·1 | 0·1, 0·2 | 11 |
| ≤25·0 | 95·8 | 92·9, 97·5 | 57·5 | 47·1, 67·2 | 2·3 | 1·8, 2·8 | 0·1 | 0, 0·1 | 11 |
| ≤25·5 | 97·6 | 95·9, 98·6 | 49 | 38·7, 59·5 | 1·9 | 1·6, 2·3 | 0 | 0, 0·1 | 11 |
| ≤26·0 | 98·9 | 97·7, 99·5 | 39·5 | 30·4, 49·5 | 1·6 | 1·4, 1·9 | 0 | 0, 0·1 | 11 |
| ≤26·5 | 99·1 | 98·3, 99·5 | 32·5 | 24·3, 41·8 | 1·5 | 1·3, 1·7 | 0 | 0, 0 | 11 |

a Studies excluded: ARG, GUI-TBC, MAL-HNW, NAM, SAF, USA-HIV, and USA-IDU, MAL-HWW, and ZAM

**Supplementary Figure 1. Histogram of MUAC measurements for individual studies**



**Supplementary Figure 2. Histogram of MUAC measurements for all studies combined**

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**Supplementary Figure 3. Histogram of BMI measurements for individual studies**

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**Supplementary Figure 4. Histogram of BMI measurements for all studies combined**

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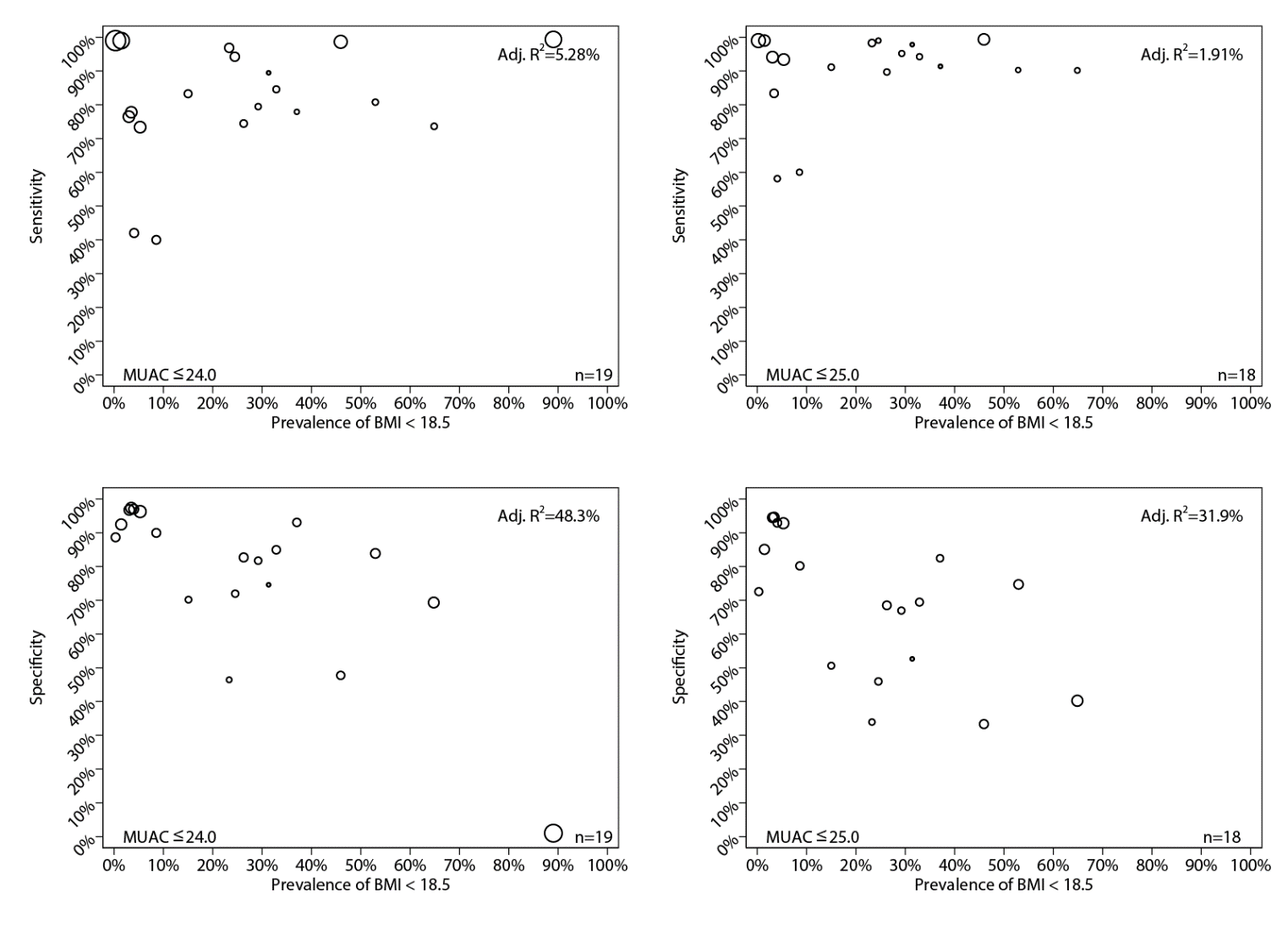
**Supplementary Figure 5. Scatterplot of BMI by MUAC for individual studies**

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**Supplementary Figure 6. Scatterplot of BMI by MUAC for all studies combined**

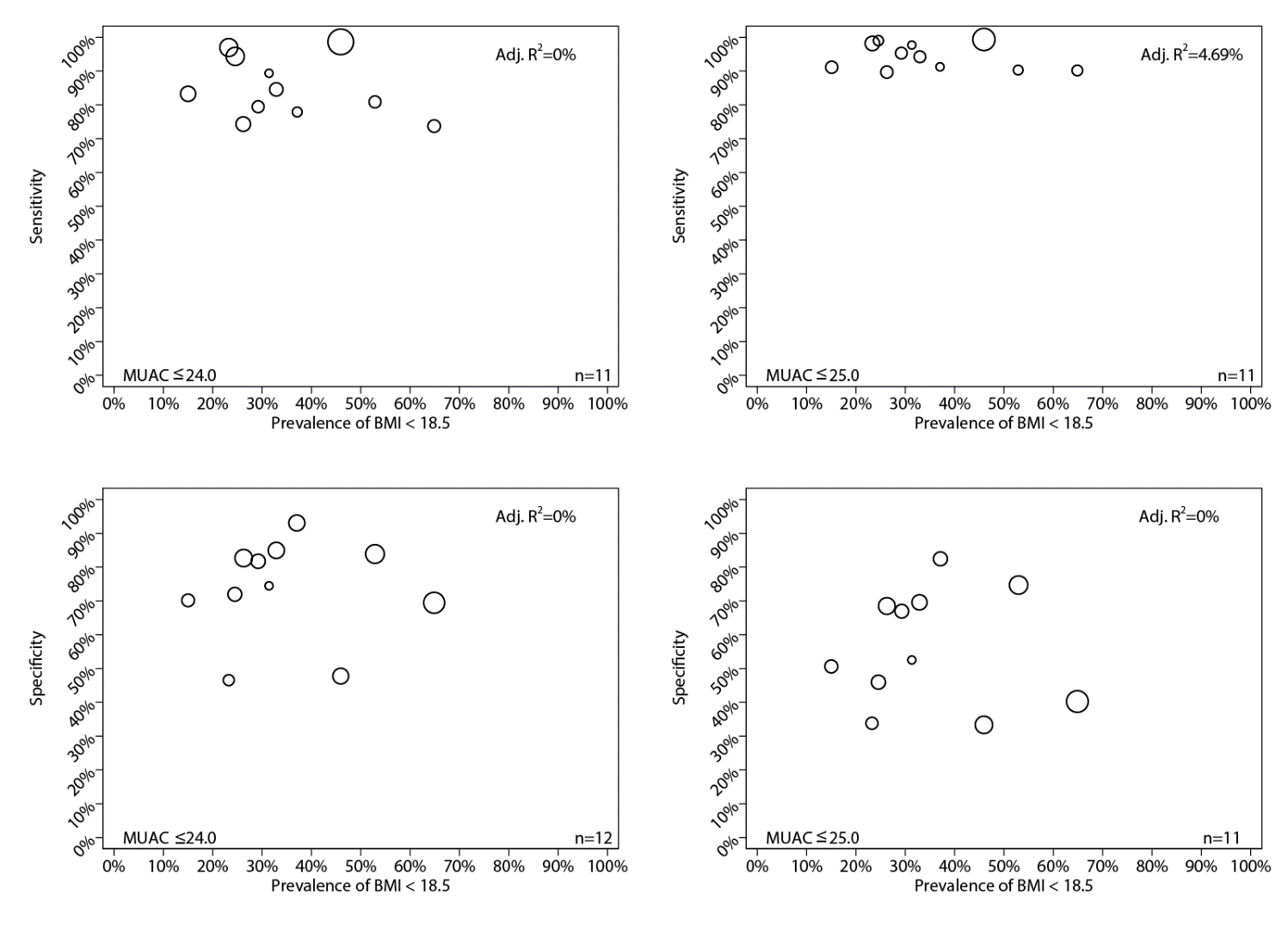
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**Supplemental Figure 7. Meta-regression analysisadepicting variability of SENS and SPEC of MUAC ≤24.0 cm (left panel) and MUAC ≤25.0 cm (right panel) by low BMI prevalence across studies (all studies included).**

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aRandom-effects meta-regression was done in Stata using themetareg command. Logit transformed sensitivity, specificity, and prevalence variables were used in the regression model.The size of circle represents the weight given to the study in the meta-regression.

**Supplemental Figure 8. Meta-regression analysisa depicting variability of SENS and SPEC of MUAC ≤24.0 cm (left panel) and MUAC ≤25.0 cm (right panel) by low BMI prevalence across studies, excluding nine studiesb with low prevalence of BMI<18.5 or BMI≥18.5 kg/m2**

****

a Random-effects meta-regression was done in Stata using themetareg command. Logit transformed sensitivity, specificity, and prevalence variables were used in the regression model. The size of circle represents the weight given to the study in the meta-regression.

bStudies excluded: ARG, GUI-TBC, MAL-HNW, NAM, SAF, USA-HIV, and USA-IDU, MAL-HWW, and ZAM