# Table S1: Search strategy using EMBASE

|  |  |
| --- | --- |
|  | Searches |
| 1 | Southeast asia or SE Asia or SE-asia or South-east asia |
| 2 | brunei or myanmar or burma or cambodia or east timor or indonesia or laos or malaysia or philippines or singapore or thailand or vietnam |
| 3 | Southeast Asia/ OR Myanmar/ OR Cambodia/ OR Timor/ OR Indonesia/ OR Laos/ OR Malaysia/ OR Philippines/ OR Singapore/ OR Vietnam/ OR Thailand/ OR Brunei |
| 4 | 1 or 2 or 3 |
| 5 | Urbani#ation or urbanicity or urban or rural or rurality |
| 6 | Urban adj3 rural |
| 7 | ( urban adj3 migra\*) OR (rural adj3 migra\*) |
| 8 | migration? or migrant? |
| 9 | urbanization/ or urban population/ or urban rural difference/ or rural population/ |
| 10 | migration/ |
| 11 | Or/5-10 |
| 12 | Obesity or obese or overweight |
| 13 | BMI or body mass index or body-mass-index or waist circumference or (waist adj3 hip adj3 ratio) |
| 14 | exp abdominal obesity/ or exp obesity/ |
| 15 | exp body mass/ or exp body height/ or exp body weight/ |
| 16 | Or/12-15 |
| 17 | 16 and 11 and 4 |
| 18 | 17 and “human” [subjects] |

# Table S2: Lists of excluded articles by mains reasons for exclusion

1. **Risk of obesity not reported by urban exposure (N=102)**

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1. **Reviews or conference abstracts (N=16)**

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1. **Not written in English (N=2)**

Badan Penelitian dan Pengembangan Kesehatan, Departemen Kesehatan Republik Indonesia. Laporan Hasil Riset Kesehatan Dasar (RISKESDAS) Indonesia tahun 2007. 2008. CV Kiat Nusa, Jakarta, Indonesia, 2008.

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1. **Comparison between urban and industrial area (N=1)**

Zailina H, Junidah R, Josephine Y and Jamal HH (2008) The influence of low blood lead concentrations on the cognitive and physical development of primary school children in Malaysia. Asia-Pacific Journal of Public Health 20: 317-326.

1. **Studies using the same dataset as those already included in the review (N=3)**

Aekplakorn W, Chaiyapong Y, Neal B, Chariyalertsak S, Kunanusont C, et al. (2004) Prevalence and determinants of overweight and obesity in Thai adults: Results of the Second National Health Examination Survey. Journal of the Medical Association of Thailand 87: 685-693.

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1. **Waiting for author’s reply (N=6)**

Adair LS (1992) Postpartum nutritional status of Filipino women. American Journal of Human Biology 4: 635-646.

Hla Soe T, Myitzu Tin O, Kyaw Ko Ko H, Zar Chi W, Khin Htet Z, et al. (2011) Prevalence and correlation of obesity, hypertension and type 2 diabetes mellitus in selected townships of Upper Myanmar. Myanmar Health Sciences Research Journal 23: 178-185.

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# Table S3: Study characteristics of studies conducted in children (<18) from Malaysia, Thailand and Indonesia

| Author | Year of publication | Country | Year of conduct | Sample size | Urban definition | Comparison | Mean age / age range | % Female |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Anuar Zaini# | 2005 | Malaysia | Not stated | 1,045 | Not clearly stated | Not clearly stated | Mean 9.68  9 to10 | 48.9 |
| Sumarni# | 2006 | Malaysia | Not clearly stated | 699 | Urban according to classification by Department of Statistics, Malaysia | Rural according to classification by Department of Statistics, Malaysia | Mean 11.1  10.6 to 12.2 | 48.5 |
| Zalilah# | 2006 | Malaysia | Not clearly stated | 6,555 | Urban based on secondary school categorization by Ministry of Education | Rural based on secondary school categorization by Ministry of Education | 11 to 15.9 | 48.8 |
| Naidu# | 2013 | Malaysia | 2006 | 144 | Urban according to National Health and Morbidity survey (NHMS III) | Rural according to National Health and Morbidity survey (NHMS III) | 7 to 12 | 49.7 |
| Poh# | 2013 | Malaysia | 2011 | 3,542 | Not clearly stated | Not clearly stated | 0.5 to 12.9 | 50.2 |
| Zainuddin# | 2013 | Malaysia | 2008 | 18,078 | Not clearly stated | Not clearly stated | 8 to 10 | Not clearly stated |
| Firestone# | 2011 | Thailand | 2004 | 4,610 | Urban classification to reflect economic and land use pattern in the province | Communities classified as rice growing, plantation, upland and mixed economy strata | 2 to 10 | 48.7 |
| Sakamoto# | 2001 | Thailand | 1997 | 1,157 | Districts in Saraburi municipality | 13 districts outside Saraburi municipality | Mean 5.8  4 to 6 | Not clearly stated |
| Rojroongwasinkul# | 2013 | Thailand | 2011 | 3.119 | Municipal areas | Non-municipal areas | 0.5 to 12.9 | Not clearly stated |
| Julia# | 2004 | Indonesia | 1999 | 2,570 | City of Yogyakarta. Urban subclassified into 2 groups: urban poor (from urban slum) and urban | City of Kidul, about 20 to 40 kms from Yogyakarta | Boys age 6-8.9  Girls age 6-7.9 | 42.3 |
| Sandjaja# | 2013 | Indonesia | 2011 | 7,211 | Not clearly stated | Not clearly stated | 0.5 to 12 | 48.5 |

# studies included in the meta analysis for children

# Table S4: Study characteristics of studies conducted in children (<18) from Laos and Vietnam

| Author | Year of publication | Country | Year of conduct | Sample size | Urban definition | Comparison | Mean age / age range | % Female |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Jurgensen# | 2009 | Laos | 2006 | 621 | Schools in urban area of Vientiane | Schools in semi urban area of Vientiane | 10 to 13 | 52.8 |
| Tuyet | 2003 | Vietnam | 1999 | 348 | First district of Ho Chi Minh City (trading area and majority of people are merchants) | Binh Chanh District (most of people are farmers and fishermen) | 7 to 9 | 100 |
| Leirop# | 2008 | Vietnam | 2004-2005 | 2,546 | Six communities based on socioeconomic characteristics and ecological conditions in Binh Thuan Province | Ten communities based on socioeconomic characteristics and ecological conditions in Binh Thuan Province | Mean 7.5  6 to 10 | Not clearly reported |
| Dang# | 2010 | Vietnam | 1992 | 5,460 | Urban according to General statistical office in both surveys. Status base on the classification at time of each survey | Rural according to General statistical office in both surveys. Status base on the classification at time of each survey | 6 to 15 | 49.3  in 1992 |
| 2000 | 9,870 | 48.7  in 2000 |
| Tang# | 2007 | Vietnam | 2002 | 1,504 | Schools in wealthy urban distracts and less wealth urban district | Schools in semi rural and rural districts | Mean 13.1  11 to 16 | 49.9 |
| Tuan\*\* | 2008 | Vietnam | 1992 | 24,068 | Urban according to General statistical office in both surveys. Status base on the classification at time of each survey | Rural according to General statistical office in both surveys. Status base on the classification at time of each survey | 2 to 65 with separate analysis for 2 to 18 and over 18 | 51.8  in 1992 |
| 2002 | 158,019 | 51.5  in 2002 |
| Le Nguyen# | 2013 | Vietnam | 2011 | 2,872 | Not clearly stated | Not clearly stated | 0.5 to 11 | 49.8 |

# studies included in the meta analysis for children \*\* the only study conducted in both children and adults

# Table S5: Study characteristics of studies conducted in Adults from Malaysia and Philippines

| Author | Year of publication | Country | Year of conduct | Sample size | Urban definition | Comparison | Mean age / age range | % Female |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Rampal# | 2007 | Malaysia | 2004 | 16,127 | Urban according to Statistics Department of Malaysia | Rural according to Statistics Department of Malaysia | Mean 36.7  15 to 93 | 57.6 |
| Amzi | 2009 | Malaysia | 2002-2003 | 6,766 | Urban according to Malaysian Adult Nutrition Survey (MANS) | Rural according to Malaysian Adult Nutrition Survey (MANS) | 18 to 59 | 50.8 |
| Jinam | 2008 | Malaysia | Not stated | 266 | Temuan and Bidayud communities | Kensiu and Jehai communities | 20 to >70 | 60.1 |
| Suzana# | 2012 | Malaysia | 2006 | 4,676 | Urban according to National Health and Morbidity survey (NHMS III) | Rural according to National Health and Morbidity survey (NHMS III) | 60 to 80+ | 53.4 |
| Mohamud | 2012 | Malaysia | 2006 | 4,341 | Urban according to National Health and Morbidity survey (NHMS III) | Rural according to National Health and Morbidity survey (NHMS III) | 47.8  (SD 14.5) | 64.9 |
| Rasiah | 2013 | Malaysia | 2007 to 2010 | 10,645 | Ten communities from Western Peninsular Malaysia | Nine communities from Eastern Peninsular Malaysia and East Malaysia | 30 and above | Not clearly stated |
| Shariff | 2014 | Malaysia | 2005 to 2009 | 625 | Households from Petaling, Selangor and cities of Kota Bharu and Kuala Lumpur | Households from palm plantations throughout Negeri Sembilan and Kalantan | 19 to 49 | 100 |
| Dahly# | 2010 | Philippines | 2005 | 1,807 | Urbanicity scale. Made up of 7 components: 1. Population size, 2. Population density, 3.Communications, 4 Transportation, 5. Markets, 6 Educational facilities and 7. Health services | | Mean 21 .5  (SD 0.30) | 45.3 |

# Studies included in meta-analysis

# Table S6: Study characteristics of studies conducted in Adults from Thailand

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Author | Year of publication | Country | Year of conduct | Sample size | Urban definition | Comparison | Mean age / age range | % Female |
| Aekplakorn# | 2007 | Thailand | 1997 | 3,109 | Urban according to Thai National Health Examination Survey (NHES II and III) | Rural according to Thai National Health Examination Survey (NHES II and III) | 15 to 59 | 64.4 |
| 2004 | 19,133 |
| Banwell# | 2009 | Thailand | 2004 | 19,133 | Self report urban location of residence at 10-12 and urban residence in 2005 (U-U) | Self report rural location of residence at 10-12 and in 2005 (R-R) | Median 29  15 to 87 | 52.5 |
| Suriyawong-paisal | 2003 | Thailand | 2000 | 5,305 | Urban according to the Thai Ministry of Interior | Rural according to the Thai Ministry of Interior | Over 35 | 60.5 |
| Jitarin# | 2010 | Thailand | 2004-2005 | 3,163 | Not clearly stated | Not clearly stated | Mean 40.7  (SD 17.2)  18 to 70 | 0 |
| Aekplakorn  (ref 54) | 2011 | Thailand | 2000 | 5,305 | Urban political district | Rural Political district | 50.2 in men  50.6 in women | 60.5 |
| Aekplakorn#  (ref 56) | 2011 | Thailand | 2008 | 19,256 | Urban according to Thai National Health Examination Survey (NHES IV) | Rural according to Thai National Health Examination Survey (NHES IV) | 20 to 80+ | 52.5 |

# Studies included in meta-analysis

# Table S7: Study characteristics of studies conducted in adults from Indonesia and Timor-Leste

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Author | Year of publication | Country | Year of conduct | Sample size | Urban definition | Comparison | Mean age / age range | % female |
| Koyama | 1988 | Indonesia | 1983 | 212 | Sekeloa, Bandung City | Kampung Tanu, Bandung City | 20 to 50+ | 60.0 |
| Sartika | 2011 | Indonesia | Not clearly stated | 180 | Urban part of City of Depok (25% engaged in agricultural activities) | Rural part of city of Depok (the majority of household engaged in agricultural activity) | Mean 46.4  35.3 to 59.6 | 50.5 |
| Ng# | 2006 | Indonesia | 2001 | 2,927 | Urban according to Purwejo Demographic Surveillance System | Rural area sub classified into quintiles according to an asset survey in 1999 | 15 to 74 | 49.7 |
| Fuke | 2007 | Indonesia | Not clearly stated | 177 | Sangsit | Pedawan | 20 to 60 | 100 |
| Ramke# | 2012 | Timor Leste | 2009-2010 | 2,003 | Urban based on national census data | Rural based on national census data | ≥ 40 | 48.1 |

# Studies included in meta-analysis

# Table S8: Study characteristics of studies conducted in adults from Laos, Vietnam and Myanmar

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Author | Year of publication | Country | Year of conduct | Sample size | Urban definition | Comparison | Mean age / age range | % Female |
| Nambooze | 2014 | Laos | 2012 | 144 | Vatluong village | Somsouk and Phouhome village | Over 65 | 61.8 |
| Nguyen# | 2007 | Vietnam | 1992-1993 | 11,981 | All three survey use urban definition according to national census | All three survey use rural definition according to national census | 15 to 51+ | 54.7 |
| 1997-1998 | 15,971 | 54.3 |
| 2001-2002 | 94,656 | 53.2 |
| Hanh | 2001 | Vietnam | 1999 | 300 | Urban area was Ben Thanh ward (district 1) in Ho Chi Minh City | Sub urban area was Phuthuan village (Nha be District) and rural area was Tam Thon Hiep (Can Gio District) in Ho Chi Minh City | 40 to 59 | 62.3 |
| Hanh# | 2001 | Vietnam | 2000 | 217 | Nguyen Cu Trinh Ward,  District 1 | Tan Thanh Dong Village,  Cu Chi District | 60 to 69 | 69.2 |
| Ly | 2013 | Vietnam | 2010 | 1,621 | Urban as determine by government official-the heads of each local commune Health Clinic | Rural and mixed urban/rural communes were defined as those that contain rural areas covering 30% to 50% of their geographic boundary | Mean 52  (SD12.5)  35 to 93 | 56.1 |
| Ha# | 2011 | Vietnam | 2000 | 14,542 | Urban using National Population and Housing census in 1999 | Rural using National Population and Housing census in 1999 | 25 to 64 | 51.2 |
| 2005 | 17,213 | 50.7 |
| Thu Hien | 2013 | Vietnam | 2008 | 1,528 | Not clearly stated | Not clearly stated | Mean 45.6 | Not clearly stated |
| Myo Thet | 1992 | Myanmar | Not stated | 2,611 | Three urban township (Sanchaung, Latha and Pabedan) in Yangon City | Hmawbi Township | Over 15 | 63.4 |

# Studies included in meta-analysis

# Table S9: Results of studies conducted in children from Malaysia

| Author  (year of publication) | Country  (year of conduct) | Obesity definition | Prevalence (%) in urban exposure group (95% CI) | Prevalence (%) in comparison group  (95% CI) | Crude odds ratio (95% CI) | Adjusted odds ratio  (95% CI) | Adjusted factors |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Anuar Zaini#  (2005) | Malaysia | BMI >95th percentile for age and sex | 6.5  (5.1 to 8.2) | 5.4  (3.2 to 7.5) | Not clearly reported | 1.22  (0.70 to 2.26) | Age and sex specific criteria for obesity |
| Sumarni#  (2006) | Malaysia | Percentiles passing BMI of 25 by International Obesity Task force (IOTF) | 20.8  (17.2 to 24.7) | 23.7  (18.3 to 29.7) | Not clearly reported | 0.85  (0.58 to 1.24) | Age and sex specific criteria for obesity |
| Percentiles passing BMI of 30 by International Obesity Task force (IOTF) | 7.2  (5.1 to 9.9) | 7.0  (4.1 to 11.1) | 1.03  (0.56 to 1.91) |
| Zalilah#  (2006) | Malaysia | BMI >85th percentile for age and sex base on WHO standard | 19.4  (17.9 to 21.0) | 17.3  (16.1 to 19.5) | Not clearly stated | 1.15  (1.01 to 1.31) | Age and sex specific criteria for obesity |
| Naidu#  (2006) | Malaysia | BMI >85th percentile for age and sex base on WHO standard | 22.6  (21.2 to 24.1) | 16.1  (14.7 to 17.5) | 1.53  (1.33 to 1.74) | 1.16  (1.01 to 1.36) | Age and sex specific definition of obesity, ethnicity, guardian BMI status, household income, guardian education |
| Poh#  (2013) | Malaysia  (2011) | Z-score based on WHO standard | 12.7 | 8.2 | Not clearly reported | 1.63  (1.29 to 2.06) | Age and sex specific criteria for obesity |
| Zainuddin#  (2013) | Malaysia  (2008) | Weight for Age Z-score based on WHO standard | 8.8  (8.0 to 9.8) | 5.9  (5.2 to 6.8) | Not clearly reported | 1.53  (1.10 to 1.77) | Age and sex specific criteria for obesity |
| BMI for Age Z-score based on WHO standard | 13.0  (11.9 to 14.3) | 8.8  (7.9 to 9.8) | 1.55  (1.24 to 1.94) |

# Studies included in meta-analysis

# Table S10: Results of studies conducted in children from Thailand and Indonesia

| Author  (year of publication) | Country  (year of conduct) | Obesity definition | Prevalence (%) in urban exposure group (95% CI) | Prevalence (%) in comparison group  (95% CI) | Crude odds ratio (95% CI) | Adjusted odds ratio  (95% CI) | Adjusted factors |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Firestone#  (2011) | Thailand (2004) | BMI >95th percentile for age and sex | Not clearly reported | Not clearly reported | 2.66  (1.91 to 3.72) | 1.73  (1.21 to 2.48) | Age and sex specific criteria for obesity, adjustments for household wealth, maternal education, household head occupation, maternal BMI, household size and ethnicity |
| Sakamoto#  (2001) | Thailand (1997) | Weight for Height index >97 of the Thai national standard | 22.7  (19.4 to 26.3) | 7.4  (5.4 to 9.9) | Not clearly reported | 3.68  (2.51 to 5.47) | Age and sex specific criteria for obesity |
| Rojroongwasinkul#  (2013) | Thailand  (2011) | Z-score based on WHO standard | 11.8 | 5.9 | Not clearly reported | 2.13  (1.62 to 2.79) | Age and sex specific criteria for obesity |
| Julia#  (2004) | Indonesia (1999) | Weight for Height Z-score > 2.0 based on WHO standard | 4.1  in non poor urban | 1.0 | Not clearly reported | 4.35  (2.32 to 8.33)  for non poor urban | Age and sex specific criteria for obesity |
| 0.5  in poor urban | 0.46  (0.51 to 2.09)  for poor urban |
| Percentiles passing BMI of 25 by International Obesity Task force (IOTF) | 4.9  in non-poor urban | 1.0 | Not clearly reported | 5.26  (2.77 to 10.00)  for non poor urban |
| 0.7  in poor urban | 0.69  (0.12 to 2.57)  for poor urban |
| Percentiles passing BMI of 25 by International Obesity Task force (IOTF) | 1.8  in non-poor urban | 0.2 | Not clearly reported | 11.11  (2.56 to 50.0)  for non-poor urban |
| 0.0  in poor urban |
| Sandjaja#  (2013) | Indonesia  (2011) | Z-score based on WHO standard | 5.1 | 1.8 | Not clearly reported | 2.96  (2.21 to 3.99) | Age and sex specific criteria for obesity |

# Studies included in meta-analysis

# Table S11: Results of studies conducted in children from Laos and Vietnam

| Author  (year of publication) | Country  (year of conduct) | Obesity definition | Prevalence (%) in urban exposure group (95% CI) | Prevalence (%) in comparison group  (95% CI) | Crude odds ratio (95% CI) | Adjusted odds ratio  (95% CI) | Adjusted factors |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Jurgensen #  (2009) | Laos  (2006) | Percentiles passing BMI of 25 by International Obesity Task force (IOTF) | 12.0  (8.9 to 16.9) | 5.0  (2.8 to 7.9) | Not clearly reported | 2.65  (1.40 to 5.24) | Age and sex specific criteria for obesity |
| Tuyet  (2003) | Vietnam (1999) | Weight for Height Z-score > 2.0 based on WHO standard | 5.2  (2.2 to 9.9) | 0.0 | Not clearly reported | Not clearly reported |  |
| Leirop#  (2008) | Vietnam (2004) | BMI >85th percentile for age and sex base on WHO standard | 4.6  (3.3 to 5.9) | 1.6  (1.0 to 2.2) | Not clearly reported | 2.94  (1.66 to 5.56) | Age and sex specific criteria for obesity |
| Dang#  (2010) | Vietnam (1992 and 2000) | Percentiles passing BMI of 25 by International Obesity Task force (IOTF) | 0.7  (0.1 to 1.2)  in 1992 | 0.4 (0.1 to 0.6) in 1992 | Not clearly reported | 1.83 (0.65 to 4.58) in 1992 | Age and sex specific criteria for obesity |
| 6.2  (4.7 to 7.7)  in 2000 | 1.2 (0.9 to 1.5) in 2000 | 5.46 (4.09 to 7.28) in 2000 |
| Tang#  (2007) | Vietnam (2002) | Percentiles passing BMI of 25 by International Obesity Task force (IOTF | 8.2  (4.0 to 12.5)  in wealth urban | 1.6  (0.8 to 2.4)  in semi-rural and rural | Not clearly reported | 5.53  (2.42 to 14.16)  for wealthy urban | Age and sex specific criteria for obesity |
| 5.8  (4.0 to 7.7)  in less wealthy urban | 3.82  (1.73 to 9.56)  in less wealthy urban |
| Percentiles passing BMI of 30 by International Obesity Task force (IOTF | 0.6  (0.0 to 1.6)  in wealthy urban | 0.2  (0.0 to 0.6)  in semi-rural and rural | Not clearly reported | 2.86  (0.15 to 168.9)  for wealthy urban |
| 0.9  (0.2 to 1.7)  in less wealthy urban | 4.6  (0.56 to 214.3)  in less wealthy urban |
| Tuan  (2008) | Vietnam  (1992 and 2002) | BMI >85th percentile for age and sex base on WHO standard age 2-17 | 1.2  (0.5 to 1.9)  in 1992 | 1.4  (0.9 to 1.9)  in 1992 | Not clearly reported | Not clearly reported | Age and sex specific criteria for obesity  Prevalence weighted to be nationally representative |
| 4.7  (4.0 to 5.3)  in 2002 | 1.1  (1.0 to 1.3)  in 2002 |
| Le Nguyen#  (2013) | Vietnam  (2011) | Z-score based on WHO standard | 14.3 | 1.4 | Not clearly reported | 11.8  (7.39 to 19.8) | Age and sex specific criteria for obesity |

#Studies included in meta-analysis

# Table S12: Results of studies conducted in adults from Malaysia and Philippines

| Author  (year of publication) | Country  (year of conduct) | Obesity definition | | | Prevalence (%) in urban exposure group (95% CI) | Prevalence (%) in comparison group  (95% CI) | Crude odds ratio (95% CI) | Adjusted odds ratio  (95% CI) | Adjusted factors |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Rampal#  (2007) | Malaysia (2004) | BMI ≥ 30 | | | 12.0  (11.2 to 12.8) | 11.3  (10.4 to 12.3) | 1.07  (0.94 to 1.21) | 1.16  (1.02 to 1.32) | Age, sex, ethnicity and current smoking |
| Amzi  (2009) | Malaysia (2002) | BMI ≥ 30 | | | 12.0  (10.8 to 13.3) | 12.3  (11.1 to 13.7) | Not clearly reported | Not clearly reported | None |
| Jinam  (2008) | Malaysia | BMI 25-29  in men | | | 25.5 in Bidayuh | 7.1 in Jehai | Not clearly reported | Not clearly reported | Age corrected to 2000 indigenous Malaysian population |
| 42.2in Temuan | 11.8 in Kensiu |
| BMI ≥ 30  in men | | | 7.6 in Bidayuh | 0 in Jehai | Not clearly reported | Not clearly reported |
| 18.3 in Temuan | 0 in Kensiu |
| BMI 25-29  in women | | | 37.7 in Bidayuh | 13.7 in Jehai | Not clearly reported | Not clearly reported | Age corrected to 2000 indigenous Malaysian population |
| 34.0 in Temuan | 13.8 in Kensiu |
| BMI ≥ 30  in women | | | 11.0 in Bidayuh | 0 in Jehai | Not clearly reported | Not clearly reported |
| 26.3 in Temuan | 5.1 in Kensiu |
| Suzana#  (2012) | Malaysia (2006) | BMI ≥ 25 | | | 44.9  (42.8 to 47.0) | 35.1  (33.0 to 37.2) | Not clearly reported | 1.3  (1.2 to 1.6) | Age restricted population (60-80), adjustments for sex, ethnicity, education, household income and marital status |
| BMI ≥ 30 | | | 11.5  (10.3 to 12.9) | 9.9  (8.7 to 11.2) | Not clearly reported | 1.1  (0.9 to 1.4) |
| WC ≥ 102 in men  WC ≥ 88 in women | | | 23.6  (21.9 to 25.4) | 18.6  (17.0 to 20.3) | Not clearly reported | 1.2  (1.0 to 1.4) |
| Mohamud (2012) | Malaysia (2006) | WC ≥ 90 in men  WC ≥ 80 in women | | | 56.5  (54.4 to 58.6) | 58.4  (56.2 to 60.5) | Not clearly reported | 0.92  (0.82 to 1.04) | Sex specific criteria, not age adjusted |
| Rasiah  (2013) | Malaysia  (2007 to 2010) | BMI ≥ 25 | Highest  Education | University education | 18 | 17 | Not clearly reported | Not clearly reported | Analysis only in men  Age standardized prevalence |
| Technical education | 22 | 23 |
| Secondary education | 15 | 14 |
| Primary education | 14 | 11 |
| No education | 9 | 3 |

# Studies included in meta-analysis

**Table S12: Results of studies conducted in adults from Malaysia and Philippines (con.)**

| Author  (year of publication) | Country  (year of conduct) | Obesity definition | | | Prevalence (%) in urban exposure group (95% CI) | Prevalence (%) in comparison group  (95% CI) | Crude odds ratio (95% CI) | Adjusted odds ratio  (95% CI) | Adjusted factors |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Rasiah  (2013) | Malaysia  (2007 to 2010) | BMI ≥ 25 | Highest  Education | University education | 17 | 14 | Not clearly reported | Not clearly reported | Analysis only in women  Age standardize prevalence |
| Technical education | 6 | 10 |
| Secondary education | 24 | 23 |
| Primary education | 24 | 21 |
| No education | 20 | 12 |
| Shariff  (2014) | Malaysia  (2005 to 2009) | BMI ≥ 25 | | | Not clearly reported | Not clearly reported | 0.98  (0.72 to 1.35) | Not clearly reported | None |
| Dahly#  (2001) \*\* | Philippines (2005) | BMI ≥ 30 | | | Not clearly reported | Not clearly reported | 1.22  (0.99 to 1.51)  in men | 1.08  (0.85 to 1.32)  in men | Age restricted range, adjustments for assets, income education and marital status |
| 1.20  (0.85 to 1.52)  in women | 1.19  (0.93 to 1.51)  in women |
| WC >85 in men | | | Not clearly reported | Not clearly reported | 1.25  (0.99 to 1.57) | 1.06  (0.82 to 1.35) |
| WC >80 in women | | | 1.27  (0.95 to 1.69) | 1.28  (0.95 to 1.71) |

# Studies included in meta-analysis; \*\* Urban exposure in multivariable regression using urbanicity score (10 points): mean urbanicity score in male 40.6; range 8-61

# Table S13: Results of studies conducted in adults from Thailand

| Author  (year of publication) | Country  (year of conduct) | Obesity definition | Prevalence (%) in urban exposure group (95% CI) | Prevalence (%) in comparison group  (95% CI) | Crude odds ratio (95% CI) | Adjusted odds ratio  (95% CI) | Adjusted factors |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Aekplakorn# (2007) | Thailand  (1997 and 2004) | BMI 25-29  In men | 20.4  17.2 to 24.1  in 1997 | 13.3  (11.4 to 15.5)  in 1997 | Not clearly reported | 1.35  (0.84 to 1.58)  in 1997 | Male only analysis, adjusted for age, geographic region, smoking and marital status |
| 25.1  (23.6 to 26.6)  in 2004 | 16.8  (15.4 to 18.2)  in 2004 | 1.56  (1.40 to 1.78)  in 2004 |
| BMI ≥ 30  In men | 7.1  (5.4 to 9.3)  in 1997 | 2.8  (1.7 to 4.7)  in 1997 | 1.30  (0.63 to 2.70)  in 1997 |
| 7.1  (6.1 to 8.3)  in 2004 | 4.5  (3.7 to 5.6)  in 2004 | 1.47  (1.18 to 1.85)  in 2004 |
| WC > 90  in men | 23.4  (18.2 to 29.5)  in 1997 | 10.1  (7.7 to 13.1)  in 1997 | 1.35  (0.83 to 2.22)  in 1997 |
| 22.7  (21.1 to 24.3)  in 2004 | 13.4  (12.0 to 14.9)  in 2004 | 1.58  (1.40 to 1.82)  in 2004 |
| BMI 25-29  in women | 23.9  (22.0 to 26.0)  in 1997 | 22.1  (19.5 to 25.0)  in 1997 | Not clearly reported | 1.36  (1.04 to 1.78)  in 1997 | Female only analysis, adjusted for age, geographic region, smoking and marital status |
| 25.4  (24.1 to 26.7)  in 2004 | 26.9  (25.2 to 28.6)  in 2004 | 1.12  (0.99 to 1.26)  in 2004 |
| BMI ≥ 30  in women | 9.9  (8.7 to 11.1)  in 1997 | 7.7  (6.5 to 9.2)  in 1997 | 1.31  (0.95 to 1.78)  in 1997 |
| 12.3  (11.1 to 13.)  in 2004 | 8.8  (8.0 to 9.8)  in 2004 | 1.35  (1.12 to 1.61)  in 2004 |
| WC > 80  in women | 32.0  (29.5 to 34.6)  in 1997 | 29.6  (27.2 to 32.2)  in 1997 | 1.35  (1.14 to 1.64)  in 1997 |
| 37.2  (34.8 to 39.7)  in 2004 | 36.0  (33.7 to 38.3)  in 2004 | 1.10  (0.98 to 1.12)  in 2004 |

# Studies included in meta-analysis

**Table S13: Results of studies conducted in adults from Thailand (con.)**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Author  (year of publication) | Country  (year of conduct) | Obesity definition | Prevalence (%) in urban exposure group (95% CI) | Prevalence (%) in comparison group  (95% CI) | Crude odds ratio (95% CI) | Adjusted odds ratio  (95% CI) | Adjusted factors |
| Banwell# (2009) | Thailand (2005) | BMI ≥ 25 | Not clearly reported | Not clearly reported | 1.61 | 1.47  (1.38 to 1.55) | Age, sex, income, education, marital status, ethnicity and region |
| Suriyawongpaisal  (2003) | Thailand  (2000) | BMI ≥ 25 | 43.0  (41.3 to 44.8) | 28.0  (26.1 to 29.9) | 1.94  (1.72 to 2.19) | Not clearly reported | None |
| Jitarin# (2010) | Thailand (2004) | BMI ≥ 23 in men | 38.6  (36.3 to 40.9) | 30.4  (28.0 to 32.9) | 1.43  (1.23 to 1.67) | 1.3  (1.1 to 1.6) | Male only analysis, adjusted for age and marital status |
| BMI ≥ 23 in women | 44.9  (42.6 to 47.2) | 44.9  (42.3 to 47.5) | Not clearly stated | 1.0  (0.87 to 1.15) | Female only analysis, did not adjust for age |
| Aekplakorn (2011, ref 54) | Thailand (2000) | BMI ≥ 30 | 6.6  (4.4 to 8.8)  in men | 3.1  (1.7 to 4.5)  in men | Not clearly reported | Not clearly reported | Age standardized to Thai population in 2000 |
| 12.6  (10.2 to 14.9)  in women | 9.7  (7.3 to 12.0)  in women |
| WC > 90 in men | 31.3  (25.4 to 37.2) | 16.2  (9.9 to 22.5) |
| WC >80 in women | 56.0  (53.1 to 58.9) | 47.5  (40.4 to 54.5) |
| Aekplakorn#  (2011, ref 56) | Thailand  (2008) | WC > 90 in men | 28.6  (25.7 to 31.5) | 15.2  (13.6 to 16.8) | Not clearly reported | 2.23  (2.01 to 2.48) | Age standardized to Thai population in 2008, gender specific criteria |
| WC > 80 in women | 48.1  (47.4 to 50.4) | 43.4  (40.6 to 46.1) | Not clearly reported | 1.21  (1.12 to 1.31) | Age standardized to Thai population in 2008, gender specific criteria |

# Studies included in meta-analysis

# Table S14: Results of studies conducted in adults from Indonesia and Timor-Leste

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Author  (year of publication) | Country  (year of conduct) | Obesity definition | | Prevalence (%) in urban exposure group (95% CI) | Prevalence (%) in comparison group  (95% CI) | Crude odds ratio (95% CI) | Adjusted odds ratio  (95% CI) | Adjusted factors |
| Koyama  (1988) | Indonesia  (1983) | BMI ≥ 27 | | 5.5  (1.1 to 15.1)  in men | 1. 0   (0 to 9.0)  in men | Not clearly reported | Not clearly reported | Male only analysis |
| 4.4  (1.2 to 11.0)  in women | (1.0)  (0 to 9.5)  in women | Female only analysis |
| Sartika  (2011) | Indonesia | BMI ≥ 25 | | 57.7  (46.9 to 68.1) | 32.9  (22.7 to 42.9) | 2.88  (1.50 to 5.54) | Not clearly reported | None |
| Ng (2006)# | Indonesia (2000) | BMI ≥ 25 | | 13.3  (9.6 to 18.1)  men  23.7  (19.6 to 28.4)  women | 10.1 (6.2 to 16.1)  men  19.6 (14.5 to 26.1)  women  in richest rural quintile | Not clearly stated | 1.35(0.77 to 2.38)  men  1.13 (0.84 to 1.88)  women | Age and sex |
| 3.1 (2.2 to 4.2)  men  10.2 (8.3 to 12.5)  women  in middle three quintile | 4.35(2.65 to 7.14)  men  2.44 (1.74 to 3.33)  women |
| 0.7 (0.2 to 2.9)  men  2.6 (1.2 to 5.8)  women  in poorest quintile | 16.67 (4.35 to 10.0) men  9.09 (4.17 to 20.0) women |
| Fuke (2007) | Indonesia  (not stated) | Visceral fat per body weight (cm2/kg) as means (SD) | Age 20s | 0.524 (0.186) | 0.576 (0.235) | Not clearly reported | Not clearly reported | Age specific and male only analysis |
| Age 30s | 0.818 (0.278) | 0.617 (0.148) |
| Age 40s | 1.047 (0.299) | 1.098 (0.307) |
| Age 20s | 0.524 (0.186) | 0.576 (0.235) |
| Ramke #  (2012) | Timor-Leste (2009) | BMI ≥ 25 | | Not clearly reported | Not clearly reported | 4.3  (2.9 to 6.3) | 2.9  (1.8 to 4.5) | Age, sex, literacy and household income |
| BMI ≥ 30 | | Not clearly reported | Not clearly reported | 9.5  (3.5 to 25.8) | 5.0  (1.7 to 15.7) |

# Studies included in meta-analysis

# Table S15: Results of studies conducted in adults from Laos, Vietnam and Myanmar

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Author  (year of publication) | Country  (year of conduct) | Obesity definition | Prevalence (%) in urban exposure group (95% CI) | Prevalence (%) in comparison group  (95% CI) | Crude odds ratio (95% CI) | Adjusted odds ratio  (95% CI) | Adjusted factors |
| Nambooze  (2014) | Laos  (2012) | BMI ≥ 23 | 16.0 | 3.1 | not clearly reported | 5.78  (1.29 to 35.0) | Age restricted population (over 65) |
| Nguyen#  (2007) | Vietnam (1992, 1997 and 2001) | BMI ≥ 25 | 4.8  (4.0 to 5.7)  in 1992 | 1.2  (1.0 to 1.4)  in 1992 | 4.13  (3.18 to 5.39)  in 1992 | 1.79  (1.64 to 1.95)  in 2001 | Age, sex, education, occupation, food expenditure |
| 9.1  (8.3 to 9.9)  in 1997 | 2.3  (2.0 to 2.6)  in 1997 | 4.28  (3.64 to 5.02)  in 1997 |
| 9.6  (9.3 to 9.9)  in 2001 | 3.5  (3.4 to 3.6)  in 2001 | 2.93  (2.77 to 3.11)  in 2001) |
| Hanh  (2001) | Vietnam (1999) | BMI ≥ 25 | 17.8  (10.9 to 26.7) | 13.0  (7.1 to 21.2)  in suburban | 1.45  (0.63 to 3.43)  compared to suburban | Not clearly reported | None |
| 6.1  (2.2 to 12.7)  in rural | 3.36  (1.20 to 10.78)  compared to rural |
| Hanh#  (2001) | Vietnam  (200) | BMI ≥ 25 | 34.2 in men | 5.6 in men | Not clearly reported | 8.71  (2.73 to 36.0) | Age restricted population (60 to 69) and stratified by sex |
| 25.0 in women | 5.4 in women | 5.83  (1.01 to 59.6) |
| Ly  (2013) | Vietnam (2010) | BMI ≥ 23 | Not clearly reported | Not clearly reported | Not clearly reported | 1.28  (0.99 to 1.66)  compared to mix urban-rural | Age, systolic blood pressure, diabetes (variable selected using backward stepwise approach) |
| 1.92  (1.0 to 3.70) compared to rural |
| BMI ≥ 25 | Not clearly stated | Not clearly stated | Not clearly reported | 1.41  (1.0 to 2.0)  compared to mix urban-rural | Systolic blood pressure, diabetes, self reported heart attack (variable selected using backward stepwise approach) |
| 2.13  (0.57 to 7.69)  compared to rural |

# Studies included in meta-analysis

**Table S15: Results of studies conducted in adults from Laos, Vietnam and Myanmar (con.)**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Author  (year of publication) | Country  (year of conduct) | Obesity definition | Prevalence (%) in urban exposure group (95% CI) | Prevalence (%) in comparison group  (95% CI) | Crude odds ratio (95% CI) | Adjusted odds ratio  (95% CI) | Adjusted factors |
| Ha#  (2011) | Vietnam (2000 and 2005) | BMI ≥ 25 | Not clearly reported | Not clearly reported | Not clearly reported | 2.39  (1.70 to 3.19)  in 2000 | Age group, sex, education level and food expenditure |
| 2.08  (1.60 to 2.72)  in 2005 |
| Tuan  (2008) | Vietnam  (1992 and 2002) | BMI ≥ 25 | 4.5  (3.4 to 5.6)  in 1992 | 1.1  (0.9 to 1.4)  in 1992 | Not clearly reported | Not clearly reported | Prevalence weighted to be nationally representative |
| 10.0  (9.5 to 10.6\_  in 2002 | 3.5  (3.3 to 3.7)  in 2002 |
| Thu Hien  (2013) | Vietnam  (2008) | BMI ≥ 23 | 31.8 | 24.4 | 1.44  (1.14 to 1.82) | 1.39  (1.02 to 1.67) | Education and smoking |
| Myo Thet  (1992) | Myanmar | BMI > 25 | 10.7  (9.0 to 12.6) | 5.9  (4.1 to 6.4) | 2.2  (1.6 to 3.0) | Not clearly reported | None |

# Studies included in meta-analysis

# Table S16: PRISMA checklist

|  |  |  |  |
| --- | --- | --- | --- |
| **Section/topic** | **#** | **Checklist item** | **Reported on page #** |
| **TITLE** | | |  |
| Title | 1 | Identify the report as a systematic review, meta-analysis, or both. | 1 |
| **ABSTRACT** | | |  |
| Structured summary | 2 | Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number. | 2 |
| **INTRODUCTION** | | |  |
| Rationale | 3 | Describe the rationale for the review in the context of what is already known. | 3 |
| Objectives | 4 | Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS). | 3 |
| **METHODS** | | |  |
| Protocol and registration | 5 | Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number. | n/a |
| Eligibility criteria | 6 | Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale. | 4 |
| Information sources | 7 | Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched. | 3 |
| Search | 8 | Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated. | Supporting document  Table S1 |
| Study selection | 9 | State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis). | 4 |
| Data collection process | 10 | Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators. | 4-5 |
| Data items | 11 | List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made. | 5 |
| Risk of bias in individual studies | 12 | Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis. | 6 |
| Summary measures | 13 | State the principal summary measures (e.g., risk ratio, difference in means). | 5 |
| Synthesis of results | 14 | Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I2) for each meta-analysis. | 6-7 |

|  |  |  |  |
| --- | --- | --- | --- |
| **Section/topic** | **#** | **Checklist item** | **Reported on page #** |
| Risk of bias across studies | 15 | Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies). | 7 |
| Additional analyses | 16 | Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified. | 6 |
| **RESULTS** | | |  |
| Study selection | 17 | Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram. | Figure 1 |
| Study characteristics | 18 | For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations. | Page 7 and Supporting file Tables S3-S8 |
| Risk of bias within studies | 19 | Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12). | Page 12 and Supporting file Tables S19-20 |
| Results of individual studies | 20 | For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot. | Figures 2 and 3; supporting document Tables S9-S15 |
| Synthesis of results | 21 | Present results of each meta-analysis done, including confidence intervals and measures of consistency. | Figures 2 and 3 |
| Risk of bias across studies | 22 | Present results of any assessment of risk of bias across studies (see Item 15). | Page 12 and Supporting file Tables S19-20 and Figures S1-S2 |
| Additional analysis | 23 | Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]). | Page 9  Figure 4  Table 1 |
| **DISCUSSION** | | |  |
| Summary of evidence | 24 | Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers). | 10-11 |
| Limitations | 25 | Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias). | 12 |
| Conclusions | 26 | Provide a general interpretation of the results in the context of other evidence, and implications for future research. | 12-13 |
| **FUNDING** | | |  |
| Funding | 27 | Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review. | 14 |

# Table S17: Sensitivity Analysis: Results from random effect analysis meta-regression (Results from Table 1) and trim and fill analysis

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Stratification** | Randon effect meta-regression | | Trim and fill analysis | |
| OR for living in an urban environemnt | P-value | OR for living in an urban environemnt | P-value |
| **None** | 1.99 (1.64 to 2.41) | <0.001 | 1.51 (1.34 to 1.71) | <0.001 |
| **Country/countries** |  |  |  |  |
| Philippines and  Malaysia | 1.29 (1.14 to 1.45) | 0.001 | 1.29 (1.28 to 1.43) | <0.001 |
| Thailand | 1.66 (1.30 to 2.11) | 0.001 | 1.47 (1.26 to 1.71) | <0.001 |
| Vietnam and Laos | 3.36 (2.14 to 5.27) | <0.001 | 1.95 (1.31 to 2.87) | <0.001 |
| Indonesia and  Timor-Leste | 3.14 (2.22 to 4.46) | 0.001 | 2.74 (2.10 to 3.59) | <0.001 |
| **Per capita GNI#**  **(US dollars)** |  |  |  |  |
| <1,500 | 3.42 (2.42 to 4.84) | <0.001 | 2.03(1.46 to 2.83) | <0.001 |
| 1,500-2,500 | 1.62 (1.20 to 2.18) | <0.001 | 1.38 (1.13 to 1.69) | <0.001 |
| > 2,500 | 1.50 (1.23 to 1.82) | 0.01 | 1.50 (1.30 to 1.72) | <0.001 |
| **Year of field work** |  |  |  |  |
| 2004 to 2013 | 1.85 (1.45 to 2.37) | <0.001 | 1.42 (1.26 to 1.73) | <0.001 |
| Up to 2003 | 2.22 (1.60 to 3.09) | <0.001 | 1.52 (1.20 to 1.94) | <0.001 |
| **Sex of study population** |  |  |  |  |
| Men only | 1.76 (1.14 to 2.73) | 0.020 | 1.69 (1.32 to 2.18) | <0.001 |
| Women only | 1.47 (0.89 to 2.43) | 0.106 | 1.21 (0.95 to 1.56) | <0.001 |
| Both | 2.19 (1.70 to 2.81) | <0.001 | 1.53 (1.30 to 1.80) | <0.001 |
| **Age of population** |  |  |  |  |
| Children | 2.43 (1.72 to 3.43) | <0.001 | 1.52 (1.13 to 2.04) | <0.001 |
| Adults | 1.65 (1.36 to 1.99) | <0.001 | 1.50 (1.33 to 1.79) | <0.001 |
| **Obesity classifcation** |  |  |  |  |
| Non BMIclassifciation  (using WC) | 2.10 (0.53 to 8.28) | 0.145 | 1.21 (0.71 to 2.06) | <0.001 |
| Obesity defined  BMI ≥ 23 or 25 | 2.13 (1.69 to 2.67) | <0.001 | 1.53 (1.33 to 1.78) | <0.001 |
| Obesity defined  as BMI ≥ 30 | 1.39 (0.90 to 2.16) | 0.104 | 1.38 (1.07 to 1.88) | <.0.001 |

Reference groups is living in a rural environment; #GNI gross national income; WC waist circumference; \* p-value for heterogeneity chi-square;\*\* Likelihood ratio test for heterogeneity between subgroup by meta-regression, providing F-ratio and p-values

# Table S18: Inter-rater agreement from abstract screening

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Inter-rater agreement | | Reviewer 2 | | |
| Relevant/  Potentially relevant | Not relevant | Total |
| Reviewer 1 | Relevant/  Potentially relevant | 112 | 8 | 120 |
| Not relevant | 23 | 558 | 581 |
| Total | 135 | 566 | 701 |

588 articles were excluded from abstract reviews and 143 full text articles were assessed for eligibility.

Kappa = 0.85 (Results are shown for articles published up to April 2013)

# Table S19: Summary of bias within studies among children

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Study | Selection bias | Information bias in exposure measurement | Information bias in outcome measurement (BMI) | confounding |
| Anuar Zaini# | low risk | unclear risk,  non differential | low risk | low risk |
| Sumarni# | low risk | low risk | low risk | low risk |
| Zalilah# | low risk | low risk | low risk | low risk |
| Naidu# | unclear risk | low risk | low risk | low risk |
| Poh# | low risk | unclear risk | low risk | low risk |
| Zainuddin# | unclear risk | low risk | low risk | low risk |
| Firestone# | low risk | low risk | low risk | low risk |
| Sakamoto# | low risk | low risk | low risk | low risk |
| Rojroongwasinkul# | low risk | low risk | low risk | low risk |
| Julia# | unclear risk | low risk | low risk | low risk |
| Sandjaja# | low risk | unclear risk | low risk | low risk |
| Jurgensen# | low risk | low risk | low risk | low risk |
| Tuyet | low risk | low risk | low risk | low risk |
| Leirop# | low risk | low risk | low risk | low risk |
| Dang# | low risk | low risk | low risk | low risk |
| Tang# | unclear risk | low risk | low risk | low risk |
| Tuan\*\* | unclear risk | low risk | low risk | low risk |
| Le Nguyen# | low risk | unclear risk | low risk | low risk |

# Studies included in meta-analysis; \*\* Study conducted in both children and adults but reported estimates separately

# Table S20: Summary of bias within studies among adults

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Study | Selection bias | Information bias in exposure measurement | Information bias in outcome measurement (BMI) | confounding |
| Rampal# | low risk | low risk | low risk | low risk |
| Azmi | unclear risk | unclear risk, non differential | low risk | unclear risk |
| Jinam | unclear risk | low risk | unclear risk | low risk |
| Suzana# | low risk | low risk | low risk | low risk |
| Mohamud | unclear risk | low risk | low risk | unclear risk |
| Rasiah | unclear risk | low risk | low risk | low risk |
| Shariff | low risk | low risk | low risk | unclear risk |
| Dahly# | low risk | low risk | low risk | low risk |
| Aekplakorn# (ref. 55) | low risk | low risk | low risk | low risk |
| Banwell# | unclear risk | unclear risk, non differential | low risk | low risk |
| Suriyawongpaisal | low risk | low risk | unclear risk | high risk |
| Jitarin # | unclear risk | unclear risk | unclear risk | low risk |
| Aekplakorn (ref. 54) | low risk | low risk | low risk | low risk |
| Aekplakorn# (ref. 56) | low risk | low risk | low risk | low risk |
| Koyama | unclear risk | low risk | unclear risk | unclear risk |
| Sartika | low risk | low risk | low risk | high risk |
| Ng# | low risk | low risk | low risk | low risk |
| Fuke | unclear risk | low risk | low risk for measurement of visceral fat | low risk |
| Ramke# | low risk | low risk | low risk | low risk |
| Nambooze | low risk | low risk | unclear risk | unclear risk |
| Nguyen# | unclear risk | low risk | unclear risk | low risk |
| Hanh (ref. 42) | unclear risk | low risk | low risk | high risk |
| Hanh# (ref. 45) | unclear risk | low risk | unclear risk | low risk |
| Ly | low risk | low risk | low risk | unclear risk |
| Ha# | low risk | low risk | low risk | low risk |
| Tuan\*\* | unclear risk | low risk | low risk | low risk |
| Thu Hien | low risk | unclear risk | low risk | unclear risk |
| Myo Thet | low risk | low risk | unclear risk | high risk |

# studies included in meta-analysis; \*\* Study conducted in both children and adults but reported estimates separately