

Supplementary Table 1. Included studies of pesticide exposure on stunting incidence (2 review, 2 RCT, 2 cohort, 2 case-control, and 5 cross sectional studies)

Study	Participants	Studies	Pesticide exposure	Stunting outcome	Summary
Salam et al. ²⁶⁾	42 Included studies (1 paper from Ter Kuile et al study)	Scoping review	Insecticide treat-net to control malaria	Coverage ITN offered RR 1.11 (0.86–1.42) on the incidence of stunting, but statistically was not significance ($P \geq 0.05$)	Using ITN was not associated with stunting
Vilcin et al. ²⁷⁾	72 Included studies (1 paper from Paudel et al study)	Systematic review	Pesticide exposure	Children exposed pesticide near home found more likely to be stunted	Pesticide exposure associated with stunting
Friedman et al. ²⁸⁾	876 Children from 39 villages were eligible to participate.	RCT	Insecticide treat-net to control malaria	Pooled data show HAZ -0.96 (-1.23 to -1.05) or 155/835 (18.5 %). ITN village was -0.98 (-1.11 to -0.85) or 79/445 (17.8%). Control -0.95 (-1.15 to -0.76) or 19.3% or 17/347 (4.9%).	ITN coverage was not associated with stunting Insecticide treat-net to control malaria
Ter Kuile et al. ¹⁷⁾	831 Children followed until 24 months (411 ITN intervention vs 420 control)	RCT	A community-based, group-randomized, controlled trial of ITNs in an area with intense malaria transmission in western Kenya	Mean difference HAZ among 0–23-month children in pre-intervention were 0.17 (-0.01 to -0.34; $P=0.08$) vs intervention period was 0.36 (0.10–0.62; $P=0.01$)	ITN implementation affected HAZ in children 0-23 month during intervention
Jaacks et al. ²⁹⁾	289 Pregnant women (aged 18–40 years) in rural areas in Bangladesh	Cohort	3,5,6-trichloro-2-pyridinol (TCPy), a metabolite of chlorpyrifos, 4-nitrophenol, a metabolite of parathion and methyl parathion, were detected in nearly all women with geometric mean (95% CI) values of 3.17 (2.82–3.56) and 18.66 (17.03–20.46) $\mu\text{g/g}$ creatinine, respectively. 3-phenoxybenzoic acid (3-PBA), a non-specific metabolite of several pyrethroids, and 2-isopropyl-4-methyl-6-hydroxypyrimidine (IMPY), a diazinon metabolite, were detected in 19.8% and 16.1% of women, respectively. The remaining 4 pesticide biomarkers (2,4-D, MDA, 4-F-3-PBA, trans-DCCA) were detected in <10% of women.	Stunted was 48.85% (n=141 from 289 participants) for 2-year follow-up and 68.2% (n=197 from 289) for 1-year follow-up	No association between exposure of pesticide with stunting during follow-up 1 and 2 years. Quartile 4 TCPy (4.97–795.37 $\mu\text{g/g}$ -creatinine) was not significant, RR= 0.99 (0.77–1.27 for 1-year follow-up) and 1.16 (0.80–1.68 for 2-year follow-up), quartile 4, 4-nitrophenol (31.90–293 $\mu\text{g/g}$ -creatinine) was not significant, RR=0.85 (0.61–1.19), IMPY (0.14–7.62 $\mu\text{g/g}$ -creatinine) was not significance, RR=1.04 (0.73–1.49) and 3-PBA (0.17–7.57 $\mu\text{g/g}$ -creatinine) was not significance, RR=0.95 (0.69–1.32) against stunting during 2-year follow-up study.
Arinaitwe et al. ¹⁸⁾	351 Infants age 6 weeks to 1 year at enrollment received ITN and trimethoprim-sulfamethoxazole prophylaxis. HIV-exposed enrolled at 99 respondents, HIV-exposed enrolled at 202 respondents and HIV-infected enrolled at 57 respondents.	Cohort	ITN was used at the first-time enrollment among HIV children who use it to prevent from malaria	Overall, 36% of study participants were mildly stunted and 34% were moderate-severely stunted was measured by HAZ. Children with mild stunting (IRR=1.24, 95% CI, 1.06–1.46, $P=0.008$) and moderate-severe stunting (IRR=1.24, 95% CI 1.03–1.48, $P=0.02$) had a similarly higher incidence of malaria compared to children without stunting	Children living in a high transmission area, stunting was associated with an increased risk of malaria regardless of HIV status. Of note, the incidence of malaria was high in this cohort despite the use of ITNs and TS prophylaxis in a substantial number of children
Kartini et al. ¹²⁾	Children at grade 4 or 5 elementary school ranging 8-12 years old in Indonesia. In total 160 subjects (48 cases and 112 control)	Case-control	No specific type of pesticide used. Pesticide exposure was defined in high, moderate and low exposure. High exposed pesticide offered aOR 3.9 (1.15 to 13.26) compared to low medium exposure on the incidence of stunting	The stunting case was 48 children and control were 112 children. Mean and SD was -2.50 (0.48) vs. -0.80 (0.75). aOR=3.9 (91.33–9.23)	High exposed pesticide posed stunting among elementary school age children.

(Continued)

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Paudel et al. ³⁰⁾	The children of 6-59 months age and their mothers were taken as a study population by matching age and community among cases and controls. Total 236 respondents, 118 case and 118 control	Case-control	No specific type of pesticide used. Pesticide exposure was taken from questionnaire delivered to mothers.	Pesticide exposure on the stunting was aOR=3.51 (1.33–9.23)	Exposure of pesticide correlated with stunting on 6 to 59 months old children
Grandjean et al. ¹¹⁾	Children at second and third grade elementary school. 37 prenatal exposed of pesticides and 35 control	Cross-sectional	Dimethyldithiophosphate, Dimethylthiophosphate, Dimethylphosphate, Diethylthiophosphate, Diethylphosphate	Height for age (z score) between control and exposed groups was in the exposed pesticides was shorter (mean±SD, -1.83±0.83; range, -3.65 to 0.35) than control (mean±SD, -1.59±0.99; range, -3.26 to 0.36), however statistic was not significant (P=0.26)	Stunting was not correlated to exposed of pesticide (P=0.26). Concentration metabolites in this study were not analyzed on the stunting incidence. The highest systolic blood pressure was seen in the exposed children, who were also stunted (P=0.03). The highest copying scores were obtained by children without signs of stunting who had also not been exposed to pesticides prenatally (P=0.01). The lowest scores were seen in stunted children who had been exposed to pesticides prenatally (P=0.02, for Stanford-binet copying score; P=0.01, for total score).
Friedman et al. ³³⁾	A total of 1862 children in the ITN group were included	Cross-sectional	Permethrin treated bed nets or ITN was used to protect children from malaria.	Of 25% respondent was found stunting (HAZ, -1.12; -1.19 to -1.06)	No explanation ITN used with incidence stunting. This study observed other factors related stunting. But using ITN to protect children from malaria was also included variable but these variables did not further analysis.
AmoakoJohnson ³⁴⁾	The analysis covered 12,636 children (1993 GDHS, 1,818; 1998 GDHS, 2,626; 2003 GDHS, 3,094; 2008 GDHS, 2,385; and 2014 GDHS, 2,713) for whom complete data were available. GDHS is Ghana Demographic Health Survey	Cross-sectional	ITN is the proportion of people who slept under an insecticide-treated net the night before they were surveyed. This method was used to protect children from malaria.	Pooled data ITN coverage with stunting was statistically significance (P<0.01; 95% CI, 0.192 (0.186, 0.199). Posterior odd ration (POR) in the model 4 found non-linear associative effect (POR=0.02).	ITN coverage had non-linear associative effect of stunting (POR=0.02).
Orozco et al. ³¹⁾	Three communities used of pesticide for potatoes crops, consisting of 54 used more intensive, 40 intermediate, 41 less intensive	Cross-sectional	All organophosphorus and carbamate pesticide for potatoes and all crops in highly intensive, intermediate and less intensive used pesticide	Measurement of height for age in less intensive was mean -1.952 and SD 1.86, intermediate was -1.257 and SD 1.276, and high intensive was -1.050 and SD 1.510, P=0.0194	There was association intensity used of pesticide in potatoes crops with HAZ in children
Handal et al. ³²⁾	154 Children residing in the high exposure communities (communities A and B) and 129 children residing in the low-exposure community (community C)	Cross-sectional	Organophosphate and carbamate pesticide were used among flower plantation farmers in Ecuador.	151 Stunting in the location, 83 (53.9%) in community A and B, while 68 (52.7%) in community C	Stunting was not associated with high exposure pesticide OR, 0.04, P=0.84

RCT, randomized controlled trial; ITN, insecticide-treated net; RR, relative risk; HAZ, height-age z score; CI, confidence interval; MDA, malathion dicarboxylic acid; DCCA, dimethylcyclopropane carboxylic acid; HIV, human immunodeficiency virus; TS, trimethoprim-sulfamethoxazole; IRR, incidence rate ratio; OR, odds ratio; aOR, adjusted OR; SD, standard deviation; GDHS, ghana demographic health survey.