

Supplement Materials:

Table S1. Prevalence and 95% confidence intervals of observed prevalence in each district by the survey year.

| Region | District | 2006 | | 2011 | | 2016 | |
|---------|----------------|-------------|----------------------|-------------|----------------------|-------------|----------------------|
| | | Sample size | Prevalence (95%CI) | Sample size | Prevalence (95%CI) | Sample size | Prevalence (95%CI) |
| Central | Bara | 114 | 10.75 (4.89, 16.60) | 139 | 10.11 (6.19, 17.18) | 129 | 5.28 (2.14, 10.86) |
| Central | Bhaktapur | 21 | 17.02 (3.05, 36.32) | 29 | 15.61 (3.92, 31.66) | 31 | 21.85 (3.63, 29.84) |
| Central | Chitawan | 145 | 29.42 (18.63, 33.42) | 131 | 7.91 (4.29, 14.52) | 26 | 4.36 (0.20, 19.07) |
| Central | Dhading | 74 | 16.07 (7.67, 25.04) | 55 | 17.41 (9.08, 30.91) | 22 | 9.09 (1.09, 29.06) |
| Central | Dhanusa | 45 | 15.91 (6.48, 29.48) | 67 | 15.03 (7.40, 25.78) | 41 | 4.56 (0.63, 16.47) |
| Central | Dolakha | 110 | 22.67 (13.76, 29.70) | 113 | 13.72 (7.60, 21.04) | 112 | 3.33 (0.98, 10.00) |
| Central | Kathmandu | 96 | 1.21 (0.2, 10.02) | 84 | 23.42 (13.22, 31.76) | 117 | 7.90 (3.12, 12.94) |
| Central | Kavrepalanchok | 33 | 10.14 (1.84, 24.32) | 41 | 3.46 (1.49, 19.94) | 38 | 13.52 (4.41, 28.06) |
| Central | Lalitpur | 110 | 11.92 (6.46, 19.36) | 66 | 16.67 (8.62, 27.84) | 151 | 6.80 (3.21, 11.83) |
| Central | Mahottari | 154 | 17.46 (10.24, 22.31) | 42 | 21.43 (10.30, 36.83) | 129 | 10.40 (5.48, 16.68) |
| Central | Makwanpur | 115 | 5.25 (3.04, 13.24) | 103 | 10.52 (6.17, 19.44) | 133 | 9.58 (5.31, 16.13) |
| Central | Nuwakot | 69 | 22.15 (13.88, 34.90) | 30 | 10.81 (2.14, 26.52) | 49 | 10.43 (3.39, 22.23) |
| Central | Parsa | 58 | 22.87 (13.82, 37.17) | 38 | 2.63 (0.07, 13.38) | 14 | 0.00 (0.00, 23.00) |
| Central | Ramechhap | 29 | 10.50 (2.19, 27.35) | 40 | 7.50 (1.60, 20.37) | 33 | 3.10 (0.07, 15.27) |
| Central | Rasuwa | 89 | 11.12 (6.34, 21.05) | 58 | 12.07 (4.99, 23.29) | 140 | 18.89 (11.91, 25.23) |
| Central | Rautahat | 55 | 13.51 (6.50, 26.67) | 51 | 7.84 (2.18, 18.86) | 47 | 10.45 (3.59, 12.08) |
| Central | Sarlahi | 57 | 15.04 (7.47, 29.88) | 48 | 8.33 (2.31, 19.98) | 22 | 12.03 (2.91, 34.93) |
| Central | Sindhuli | 54 | 21.43 (9.25, 31.43) | 25 | 5.77 (2.52, 31.21) | 21 | 0 (0.00, 16.00) |
| Central | Sindhupalchok | 88 | 8.15 (3.23, 15.73) | 63 | 16.15 (9.08, 29.08) | 53 | 8.03 (0.63, 16.47) |
| Eastern | Bhojpur | 101 | 16.90 (9.35, 24.40) | 112 | 11.47 (6.32, 18.96) | 124 | 12.18 (8.21, 21.02) |
| Eastern | Dhankuta | 35 | 4.91 (0.70, 19.07) | 54 | 11.11 (4.18, 22.63) | 16 | 6.25 (0.15, 29.49) |
| Eastern | Ilam | 133 | 8.06 (4.24, 14.36) | 54 | 14.51 (5.39, 24.90) | 111 | 3.72 (0.58, 10.03) |
| Eastern | Jhapa | 93 | 6.00 (1.77, 12.11) | 48 | 26.16 (16.97, 44.04) | 136 | 3.93 (1.22, 10.01) |
| Eastern | Khotang | 126 | 20.83 (13.89, 28.75) | 74 | 20.83 (12.90, 32.70) | 75 | 5.00 (1.47, 13.09) |
| Eastern | Morang | 51 | 8.99 (5.73, 26.25) | 106 | 11.32 (5.99, 18.95) | 10 | 0 (0.00, 31.00) |
| Eastern | Okhaldhunga | 43 | 19.21 (10.02,36.04) | 104 | 10.23 (5.39, 18.14) | 19 | 0 (0.00, 18.00) |
| Eastern | Panchthar | 55 | 12.43 (5.27, 24.46) | 70 | 14.29 (7.04, 24.70) | 14 | 0 0.00, 23.00) |
| Eastern | Sankhuwasabha | 112 | 14.50 (7.01, 20.08) | 128 | 13.30 (8.60, 21.30) | 82 | 10.08 (5.93, 22.71) |
| Eastern | Saptari | 82 | 6.89 (4.31, 18.38) | 42 | 16.67 (6.98, 31.36) | 53 | 7.63 (2.10, 18.21) |
| Eastern | Siraha | 144 | 16.42 (9.25, 21.43) | 122 | 11.19 (5.80, 17.51) | 118 | 7.38 (4.13, 15.04) |
| Eastern | Solukhumbu | 37 | 7.40 (1.67, 21.88) | 13 | 0.00 (0.00, 25.00) | 49 | 0.00 (0.00, 8.00) |
| Eastern | Sunsari | 41 | 21.89 (10.56, 37.63) | 43 | 11.63 (3.89, 25.06) | 48 | 10.43 (3.47, 22.66) |
| Eastern | Taplejung | 96 | 8.74 (2.32, 13.09) | 104 | 16.72 (7.57, 21.54) | 34 | 1.63 (0.07, 14.85) |
| Eastern | Terhathum | 14 | 7.14 (0.18, 33.08) | 22 | 13.64 (2.91, 34.90) | 17 | 0.00 (0.00, 20.00) |
| Eastern | Udayapur | 86 | 12.58 (6.55, 21.74) | 136 | 11.03 (6.30, 17.55) | 63 | 3.11 (3.97, 10.97) |

| | | | | | | | |
|---------|--------------|-----|----------------------|-----|----------------------|-----|---------------------|
| Western | Arghakhanchi | 125 | 9.32 (5.03, 16.17) | 87 | 24.14 (15.60, 34.50) | 119 | 8.22 (4.12, 14.91) |
| Western | Baglung | 41 | 10.61 (2.73, 23.08) | 10 | 0.00 (0.00, 31.00) | 24 | 3.58 (0.10, 20.53) |
| Western | Gorkha | 2 | 0/2 * | - | - | - | - |
| Western | Gulmi | 168 | 16.70 (11.38, 23.19) | 157 | 10.83 (6.46, 16.77) | 125 | 6.97 (2.28, 11.20) |
| Western | Kapilbastu | 47 | 5.05 (1.38, 17.51) | 9 | 1/9* | 27 | 0.00 (0.00, 13.00) |
| Western | Kaski | 35 | 7.63 (1.78, 23.04) | 36 | 8.27 (3.10, 26.05) | 62 | 0.00 (0.00, 7.25) |
| Western | Lamjung | 70 | 11.03 (6.04, 23.01) | 57 | 18.28 (8.72, 29.92) | 69 | 0.85 (0.01,10.01) |
| Western | Manang | - | - | 36 | 16.67 (6.37, 32.81) | 12 | 8.33 (0.18, 37.66) |
| Western | Mustang | 50 | 25.59 (11.52, 35.96) | 28 | 8.90 (2.27, 28.26) | 39 | 0.00 (0.00, 9.00) |
| Western | Myagdi | 67 | 8.40 (1.65, 14.56) | 74 | 12.84 (6.67, 23.46) | 70 | 8.79 (2.36, 15.91) |
| Western | Nawalparasi | 173 | 12.01 (6.29, 15.94) | 127 | 25.10 (14.50, 29.41) | 140 | 7.14 (3.48, 12.75) |
| Western | Palpa | 91 | 17.00 (8.68, 24.46) | 116 | 10.34 (5.46, 17.42) | 33 | 1.47 (0.10, 15.28) |
| Western | Parbat | 18 | 16.67 (3.50, 41.40) | 28 | 28.57 (13.24, 48.67) | 49 | 2.48 (0.06, 10.50) |
| Western | Rupandehi | 74 | 2.83 (0.85, 11.42) | 79 | 14.73 (8.10, 25.02) | 126 | 8.24 (3.87, 14.12) |
| Western | Syangja | 37 | 17.95 (7.99, 35.14) | 34 | 17.65 (6.76, 34.52) | 47 | 6.11 (1.35, 17.51) |
| Western | Tanahu | 21 | 14.29 (3.05, 36.34) | - | - | 52 | 1.86 (0.02, 10.01) |
| Mid- | Banke | 44 | 10.54 (1.44, 18.64) | 6 | 0/6* | 20 | 4.18 (0.12, 24.21) |
| Western | | | | | | | |
| Mid- | Bardiya | 26 | 15.38 (42.85, 34.85) | 27 | 22.22 (8.65, 42.25) | 14 | 7.14 (0.17, 33.09) |
| Western | | | | | | | |
| Mid- | Dailekh | 27 | 22.22 (8.61, 42.27) | 22 | 31.82 (13.89,54.87) | 23 | 0.00 (0.00, 15.00) |
| Western | | | | | | | |
| Mid- | Jajarkot | 31 | 6.45 (0.81, 21.34) | 48 | 8.33 (2.28, 19.99) | 53 | 12.29 (4.27, 23.02) |
| Western | | | | | | | |
| Mid- | Surkhet | 39 | 7.69 (1.59, 20.85) | 80 | 23.75 (14.95, 34.57) | 35 | 11.27 (3.19, 26.72) |
| Western | | | | | | | |
| Mid- | Dolpa | 28 | 17.86 (6.11, 36.88) | 45 | 0.00 (0.00, 8.00) | 25 | 4.54 (0.10, 19.78) |
| Western | | | | | | | |
| Mid- | Humla | 122 | 4.05 (1.86, 10.38) | 153 | 13.78 (9.75, 21.71) | 82 | 9.01 (3.50, 16.75) |
| Western | | | | | | | |
| Mid- | Jumla | 76 | 16.92 (9.43, 27.46) | 59 | 16.95 (8.45, 28.97) | 34 | 11.10 (3.30, 27.45) |
| Western | | | | | | | |
| Mid- | Kalikot | 40 | 14.89 (5.71, 29.85) | 76 | 23.68 (14.67, 34.82) | 57 | 6.60 (1.95, 17.02) |
| Western | | | | | | | |
| Mid- | Mugu | 56 | 3.90 (1.12, 14.87) | 29 | 6.90 (0.85, 28.97) | 76 | 3.81 (0.79, 11.10) |
| Western | | | | | | | |
| Mid- | Dang | 21 | 9.52 (11.78, 30.28) | 49 | 20.44 (10.25, 22.69) | 93 | 0.00 (0.00, 4.95) |
| Western | | | | | | | |
| Mid- | Pyuthan | 66 | 0.00 (0.00, 6.84) | - | - | 26 | 0 (0.00, 13.00) |
| Western | | | | | | | |
| Mid- | Rolpa | 79 | 16.78 (7.15, 23.57) | 71 | 12.94 (5.00, 21.07) | 76 | 7.38 (3.00, 16.37) |
| Western | | | | | | | |
| Mid- | Rukum | 9 | 0/9* | - | - | - | - |

| | | | | | | | |
|-------------|------------|-----|----------------------|-----|----------------------|-----|----------------------|
| Western | | | | | | | |
| Mid-Western | Salyan | 13 | 7.69 (0.19, 35.26) | 27 | 7.41 (0.86, 24.19) | 24 | 0.00 (0.00, 14.00) |
| Far-Western | Achham | 104 | 6.89 (3.40, 14.58) | 153 | 18.19 (10.30, 22.44) | 99 | 20.54 (11.10, 27.22) |
| Far-Western | Baitadi | 23 | 17.39 (4.93, 38.78) | 108 | 12.96 (7.29, 20.81) | 59 | 1.94 (0.04, 10.01) |
| Far-Western | Bajhang | 133 | 10.00 (7.02, 18.78) | 117 | 8.85 (4.78, 16.21) | 68 | 2.40 (0.34, 10.18) |
| Far-Western | Bajura | 97 | 10.08 (5.05, 18.15) | 117 | 11.40 (7.35, 20.27) | 113 | 8.03 (3.07, 13.46) |
| Far-Western | Dadeldhura | 70 | 20.17 (11.43, 31.28) | 42 | 11.90 (3.98, 25.65) | 41 | 4.99 (5.80, 16.45) |
| Far-Western | Darchula | 139 | 6.28 (2.98, 11.93) | 119 | 14.53 (7.91, 20.93) | 51 | 4.36 (0.47, 13.40) |
| Far-Western | Doti | 47 | 8.51 (23.61, 20.34) | 38 | 2.63 (0.12, 13.38) | 91 | 4.72 (1.20, 10.88) |
| Far-Western | Kailali | 82 | 11.11 (4.34, 18.31) | 123 | 13.01 (8.29, 21.16) | 215 | 6.90 (4.67, 12.33) |
| Far-Western | Kanchanpur | 244 | 9.80 (5.71, 13.35) | 186 | 7.12 (3.38, 10.99) | 181 | 10.54 (6.88, 16.56) |

*Presented as number of diarrhea/number of responders, due to small number (<10) of responders.

Table S2. Spatial autocorrelation analysis of the median of posterior distribution of δ_{jt} , categorized by the survey year.

| Year | Moran's I | Expected Index | variance | z-score | p-value |
|------|-------------|----------------|----------|-----------|----------|
| 2006 | -0.014451 | -0.013699 | 0.004800 | -0.010856 | 0.991339 |
| 2011 | -0.011255 | -0.014286 | 0.003478 | -0.052144 | 0.958414 |
| 2016 | 0.070755 | -0.013889 | 0.003162 | 1.505359 | 0.132232 |

Table S3. Posterior summaries of the final Bayesian spatial-temporal model parameters of full model[§].

| Covariates | Median (95% Bayesian credible interval) | OR (95%BCI) |
|-------------------------------------|---|--------------------|
| Gender (Girl) # | 0.22 (0.12, 0.33)* | 1.24 (1.13, 1.39) |
| Age of child (<12month) # | | |
| 12-24 month | 0.18 (0.04, 0.32)* | 1.20 (1.04, 1.38) |
| >24 month | -0.86 (-0.99, -0.73)* | 0.42 (0.37, 0.48) |
| Mother' education year | -0.07 (-0.14, -0.003)* | 0.93 (0.87,0.997) |
| Mother's age when gave birth | -0.03 (-0.09, 0.02) | 0.97 (0.91, 1.03) |
| Live with mother | 1.08 (-0.11, 2.72) | 0.97 (0.91, 1.02) |
| Type of place of residence (Rural)# | -0.04 (-0.17, 0.10) | 0.999 (0.87, 1.15) |
| Water source (Unimproved)# | 0.002 (-0.14, 0.14) | 1.002 (0.81, 1.13) |
| Sanitation (Unimproved) # | -0.10 (-0.24, 0.04) | 0.79 (0.70, 0.91) |
| Fuel (Nonsolid) # | -0.04 (-0.26, 0.18) | 0.90 (0.79, 1.04) |
| Season (Spring)# | | |
| Summer | -0.14 (-0.29, 0.01) | 0.87 (0.75, 1.01) |
| Autumn | -0.85 (-1.11, -0.58) | 0.43 (0.33, 0.56) |
| Winter | -0.66 (-0.90, -0.42) | 0.52 (0.41, 0.66) |
| iid component | 7.50 (4.83, 11.97) | - |
| Spatial component | 1361.91 (135.42, 7150.97) | - |
| ρ | -0.26 (-0.63, 0.17) | - |

[§]The full model assigned \mathbf{R}_d through the intrinsic conditional autoregressive (iCAR) specification and t \mathbf{R}_t a structure of autoregressive model of order 1 (AR1). *Baseline is presented in bracket; *significant effect based on 95% Bayesian credible interval.

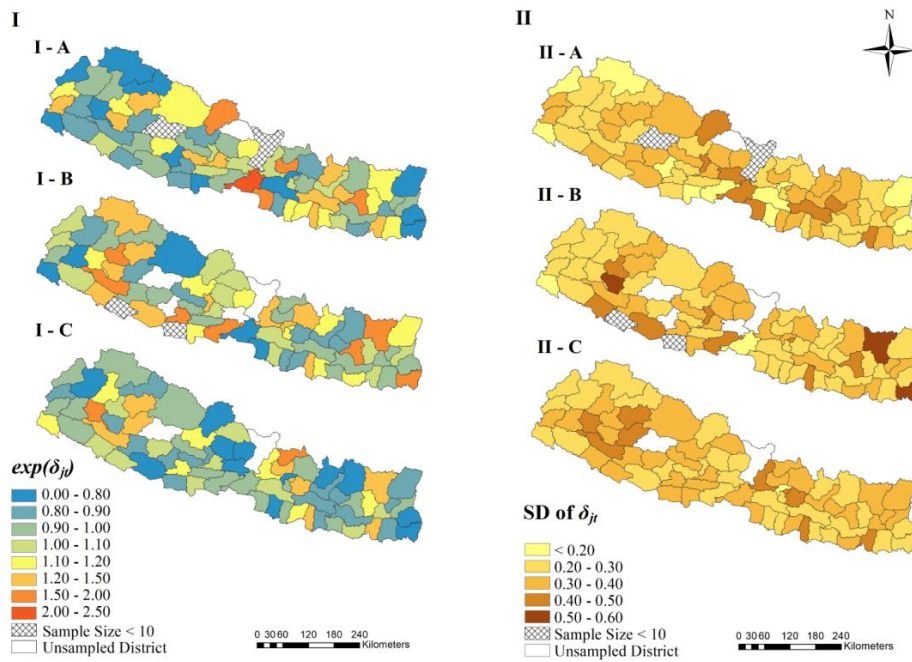


Figure S1. Posterior median (I) and *SD* (II) of the term δ_{it} for spatial-temporal random effects in Nepal, stratified by the survey years.

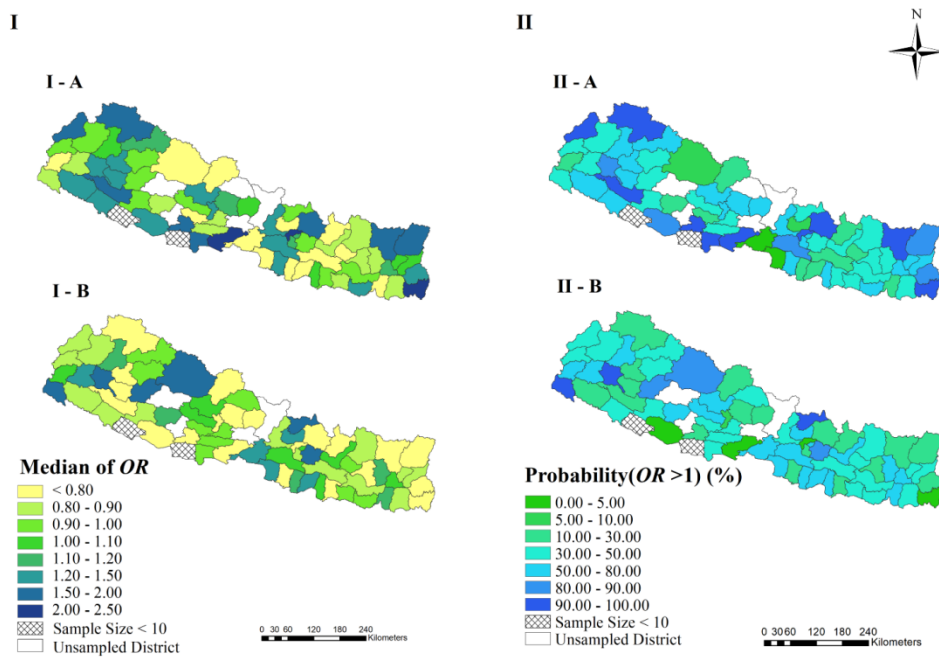


Figure S2. The temporal change of δ_{it} . (I-A) and (I-B) present the median of posterior distribution of *OR* between the survey year 2011–2006 and 2016–2011, respectively. (II-A) and (II-B) present the probability of $OR > 1$ for the survey year 2011–2006 and 2016–2011, respectively.