Intimate Partner Violence and Malnutrition among Women of Reproductive Age in Western Africa: A Geostatistcal Analysis

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A joint work with

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Intimate partner violence (IPV)

- Any behavior within an intimate relationship that leads to physical, mental, emotional or sexual injury to others in the relationship.
- It includes physical harassment, sexual coercion, psychological torture, and controlling behaviors.
- Most reported cases are perpetrated by men towards women.

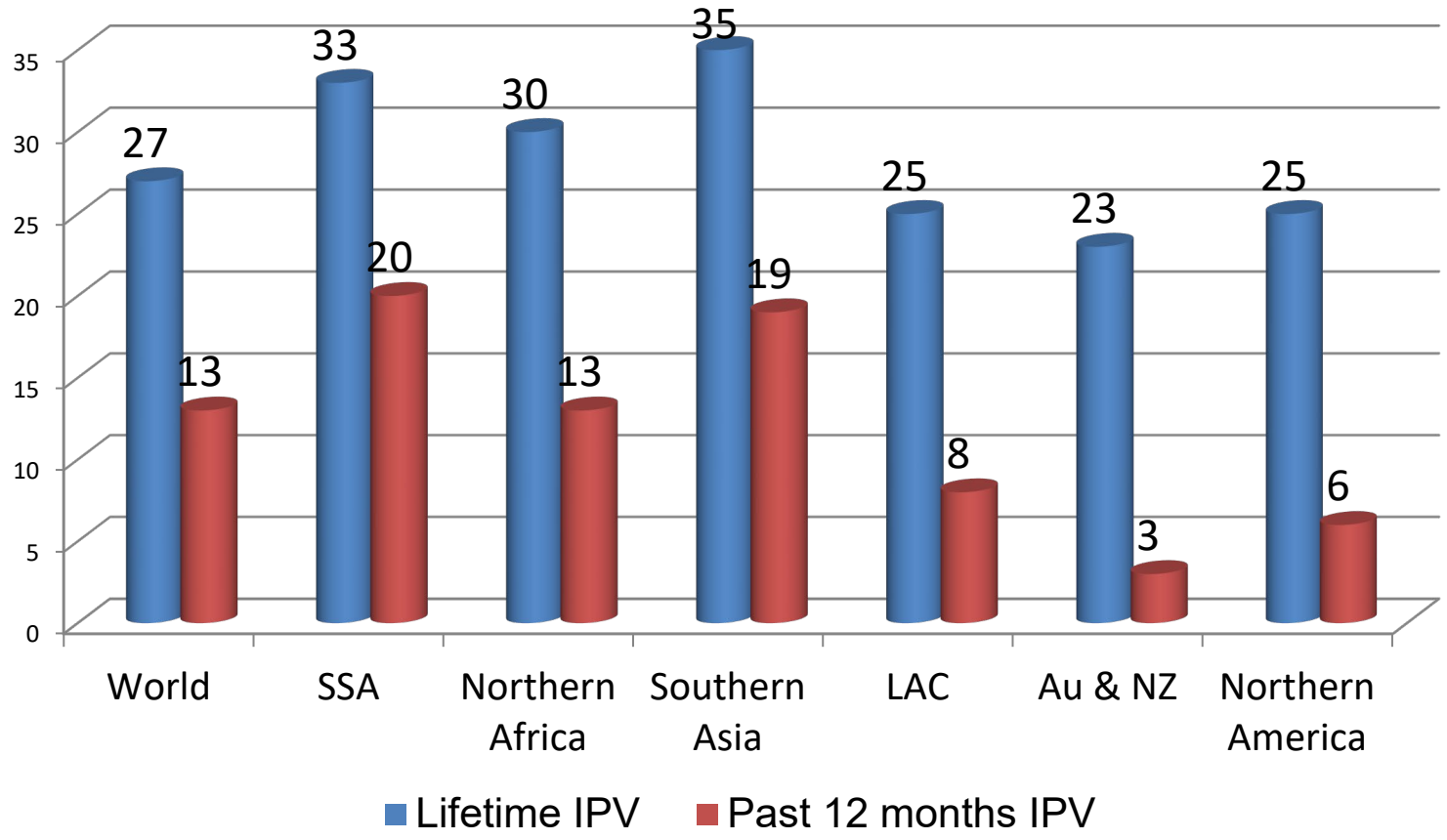

Fig. 1: Prevalence of IPV among ever-married/partnered women aged 15–49 years in selected regions of the world.

Source: WHO, 2018

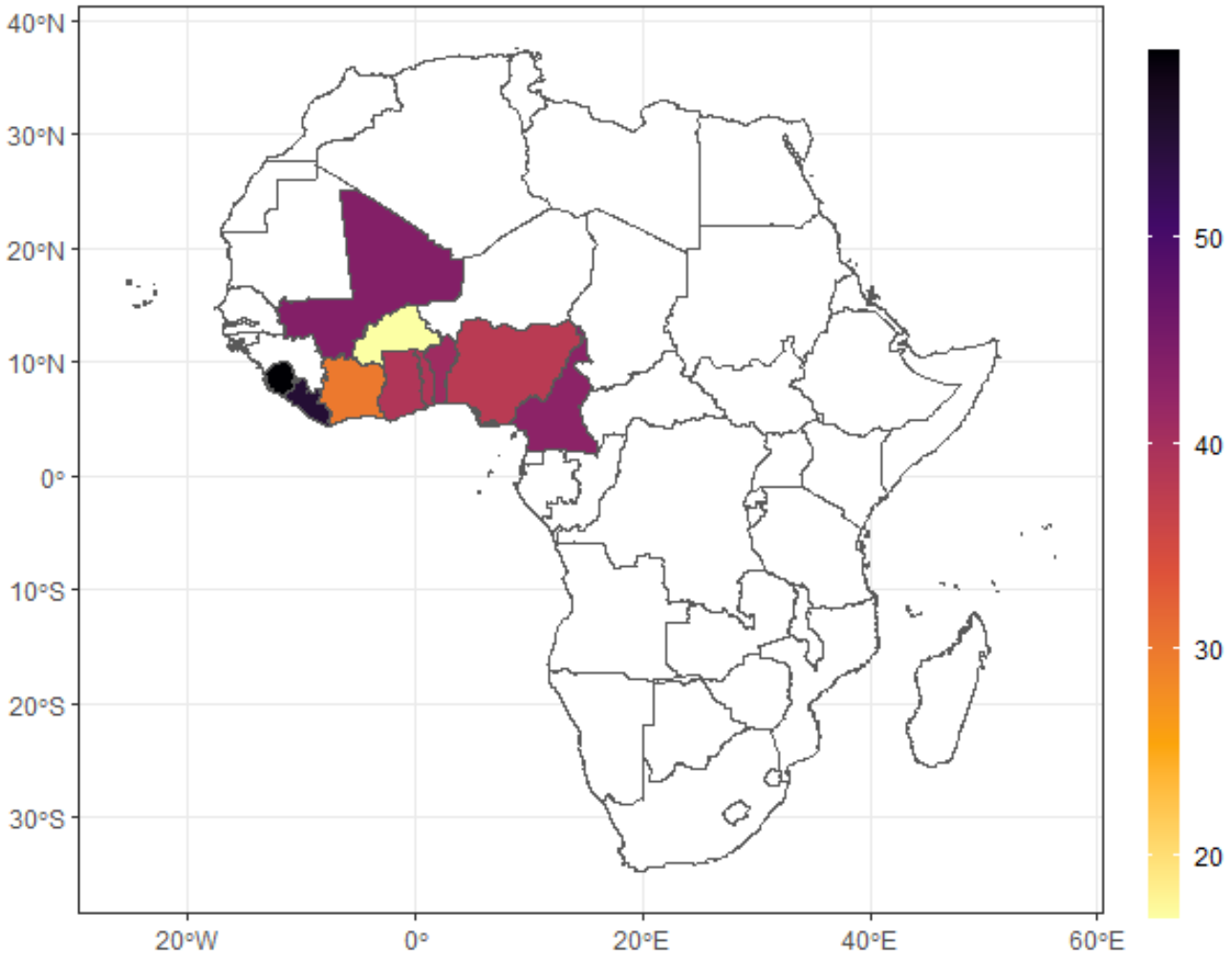

Fig. 2: Prevalence of lifetime IPV for some West African countries (physical, sexual or emotional)

Source: DHS data

Consequences of IPV in women

- Eating disorders, chronic fatigue and unhealthy weight loss
- Psychological stress which increases oxidative stress and metabolic levels.
- Abusive partners more likely withhold food from their victims, leaving them to starve
- Women experiencing IPV may be incapable of deciding for themselves, including inability to decide the choice, quantity and type of food that they eat

An implication: IPV and nutritional status can be highly correlated

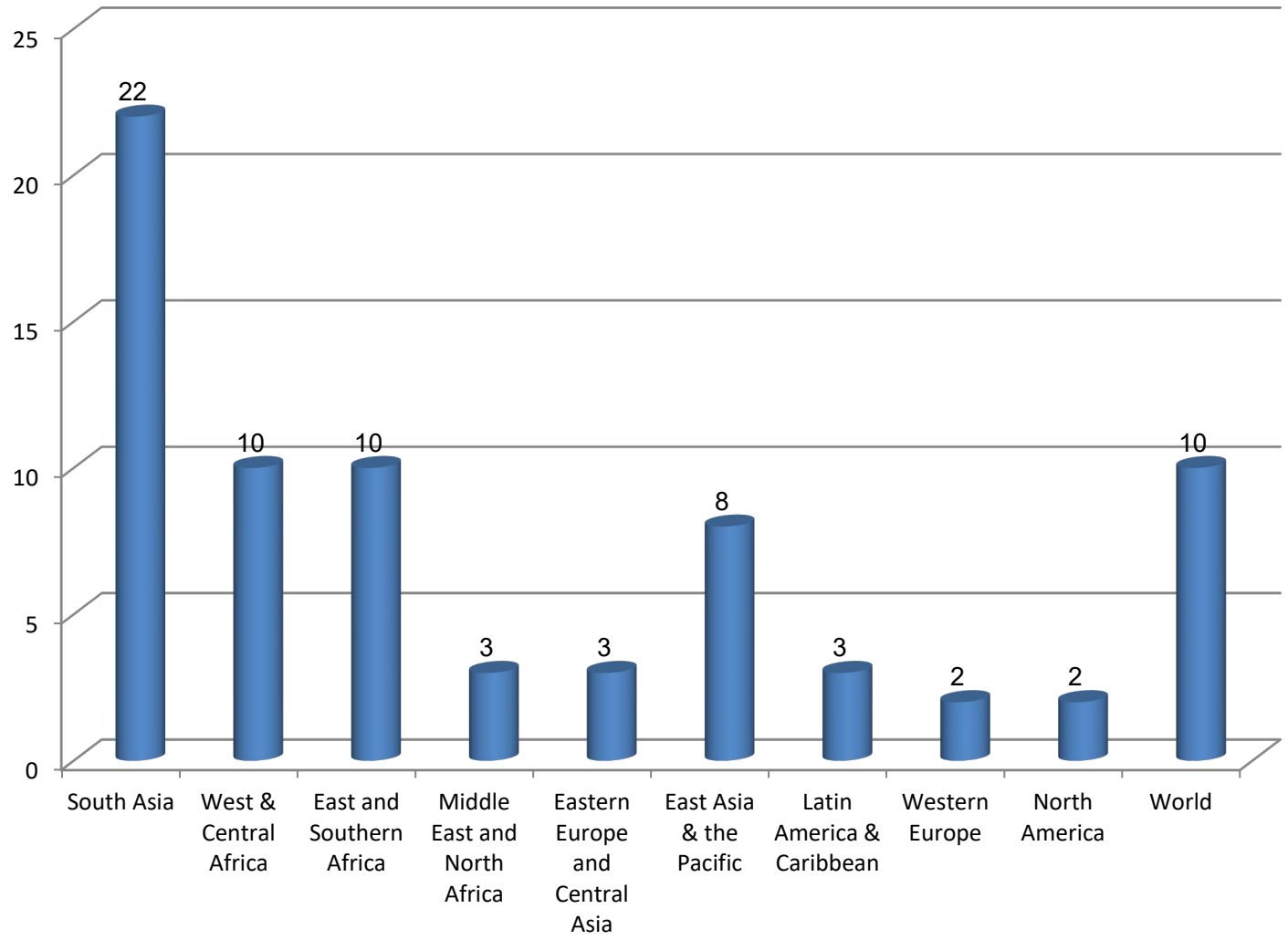

Fig. 3: Prevalence of underweight among women aged 20-49 years by 2016

Source: UNICEF, 2023

Our aim

- Explore the relationship between IPV and undernutrition across smaller geographical settings in West African countries in a manner that considers the neighborhood structure of the settings

- Provide insight into the variations across different locations, aiding location-specific policies and interventions

Data Source

- Demographic and Health Survey
- 10 West African countries with data collected at different times between 2010 and 2020
- We considered IPV (physical, emotional or sexual violence)
- Underweight and thinness

Table 1: Measuring IPV

Physical violence	Sexual violence	Emotional violence
• Pushing or shaking you or throwing something at you • Slapping you • Twisting your arm or pulling your hair • Punching you with his fist or with something that could hurt you • Kicking you, dragging you or beat you up • Threaten or attack you with a knife, gun, or any other weapon • Trying to choke you or burn you on purpose	• Physically forcing you to have sexual intercourse with him even when you did not want to • Physically forcing you to perform any other sexual acts you did not want to • Forcing you with threats or in any other way to perform sexual acts you did not want to	• Saying or doing something to humiliate you in front of others • Threaten to hurt or harm you or someone close to you • Insulting you or making you feel bad about yourself

Measurement of undernutrition in adult women

Measured through body mass index (BMI)

$$BMI = \frac{weight\ (kg)}{height\ (m^2)}$$

BMI < 18.5kg/m2 ⟶ Underweight

BMI < 17.0 kg/m2 ⟶ Thin

Geostatistical model

- Assuming Y_1 and Y_2 are binary indicators for IPV and undernutrition, respectively
- We considered a bi-probit spatial model
- Y_1 and Y_2 are considered to have been generated from some latent variables Y_1^* and Y_2^* such that

$$Y_1 = \begin{cases} 1 & \text{if} \quad Y_1^* > 0 \\ 0 & \text{if} \quad \text{otherwise} \end{cases}$$

and

$$Y_2 = \begin{cases} 1 & \text{if} \quad Y_2^* > 0 \\ 0 & \text{if} \quad \text{otherwise} \end{cases}$$

The model

- Bivariate normal for the latent variables

$$\begin{bmatrix} Y_1^* \\ Y_2^* \end{bmatrix} \Big| \boldsymbol{\nu} \sim N\left(\begin{bmatrix} \mu_1 \\ \mu_2 \end{bmatrix}, \begin{bmatrix} \sigma_1^2 & \rho\sigma_1\sigma_2 \\ \rho\sigma_1\sigma_2 & \sigma_2^2 \end{bmatrix} \right)$$

$$\vartheta' = (\mu_1, \mu_2, \rho)$$

- Distributional regression framework

$$\vartheta_k = h_k^{\vartheta_k}\left(\eta_i^{\vartheta_k}\right)$$

$$\eta_i^{\vartheta_k} = \alpha^{\vartheta_k} + \beta^{\vartheta_k}(v_i^m) + f_p^{\vartheta_k}\left(v_i^l\right) + u^{\vartheta_k}(s_i)$$

Bayesian inference

- Priors
  - Linear terms (α and $\boldsymbol{\beta}$): diffuse prior
  - Nonlinear term ($f(v_i)$): Bayesian p(enalized) spline with 20 equidistance knots and a second-order random walk as hyperprior
  - Spatial term ($u(s_i)$): Gaussian Markov random field
- MCMC
  - Metropolis-Hastings algorithm based on iteratively weighted least square (IWLS)
  - 35,00 iterations, 5,000 burn-in sample and thinned every 30th observations for parameter estimation

The findings

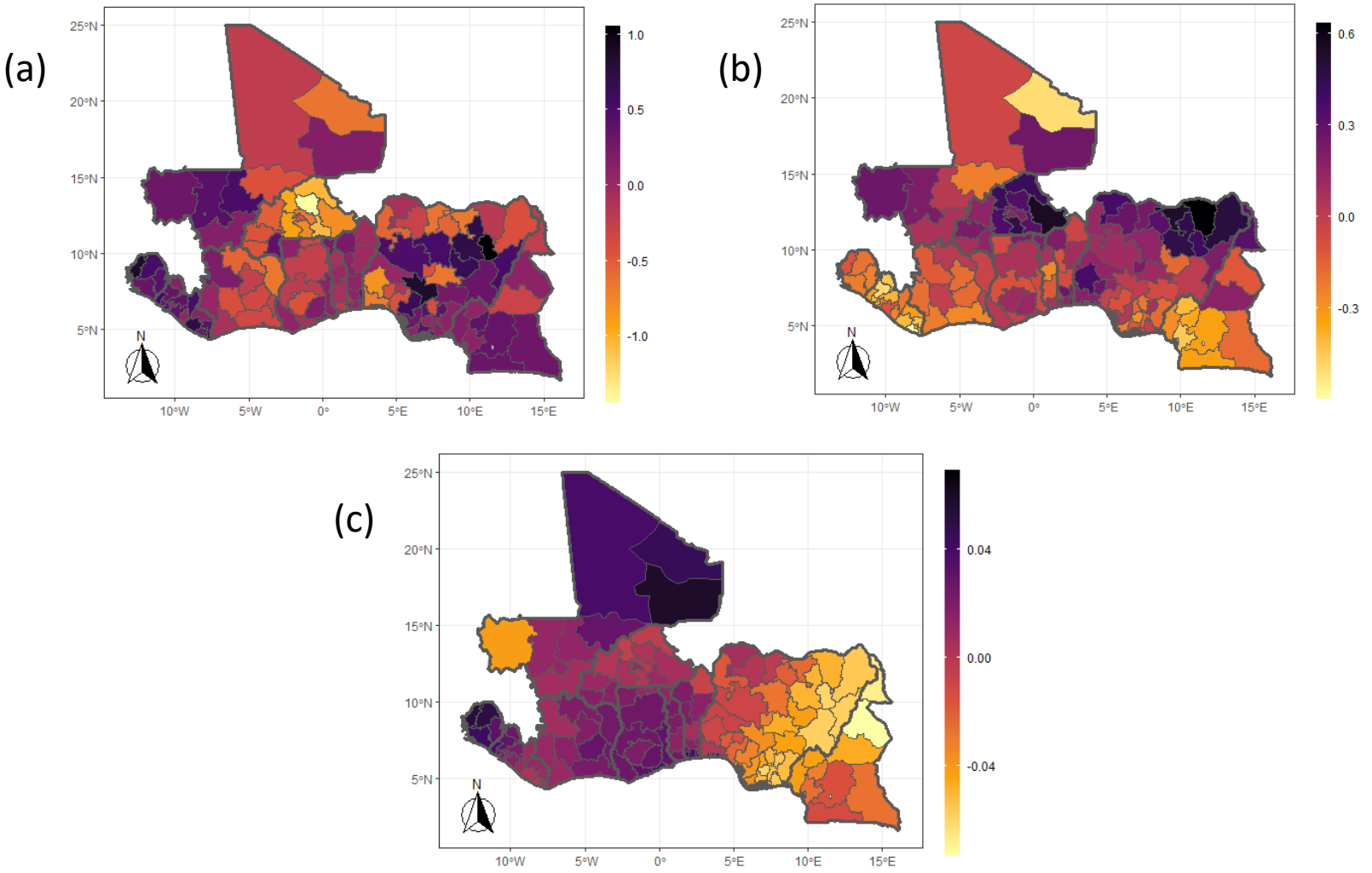

Fig. 4: Spatial effects for (a) IPV, (b) underweight, and (c) correlation

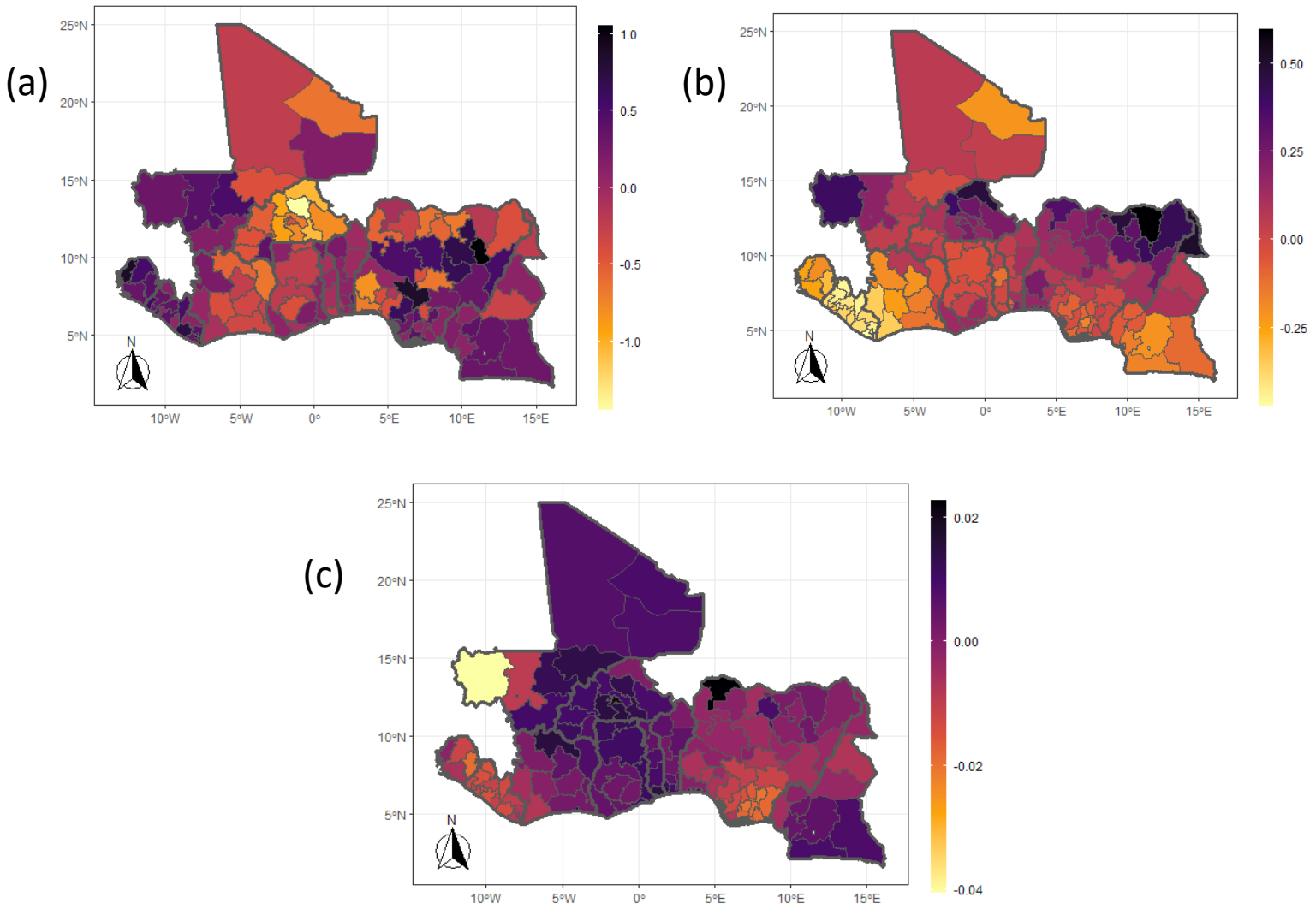

Fig. 5: Spatial effects for (a) IPV, (b) thinness, and (c) correlation

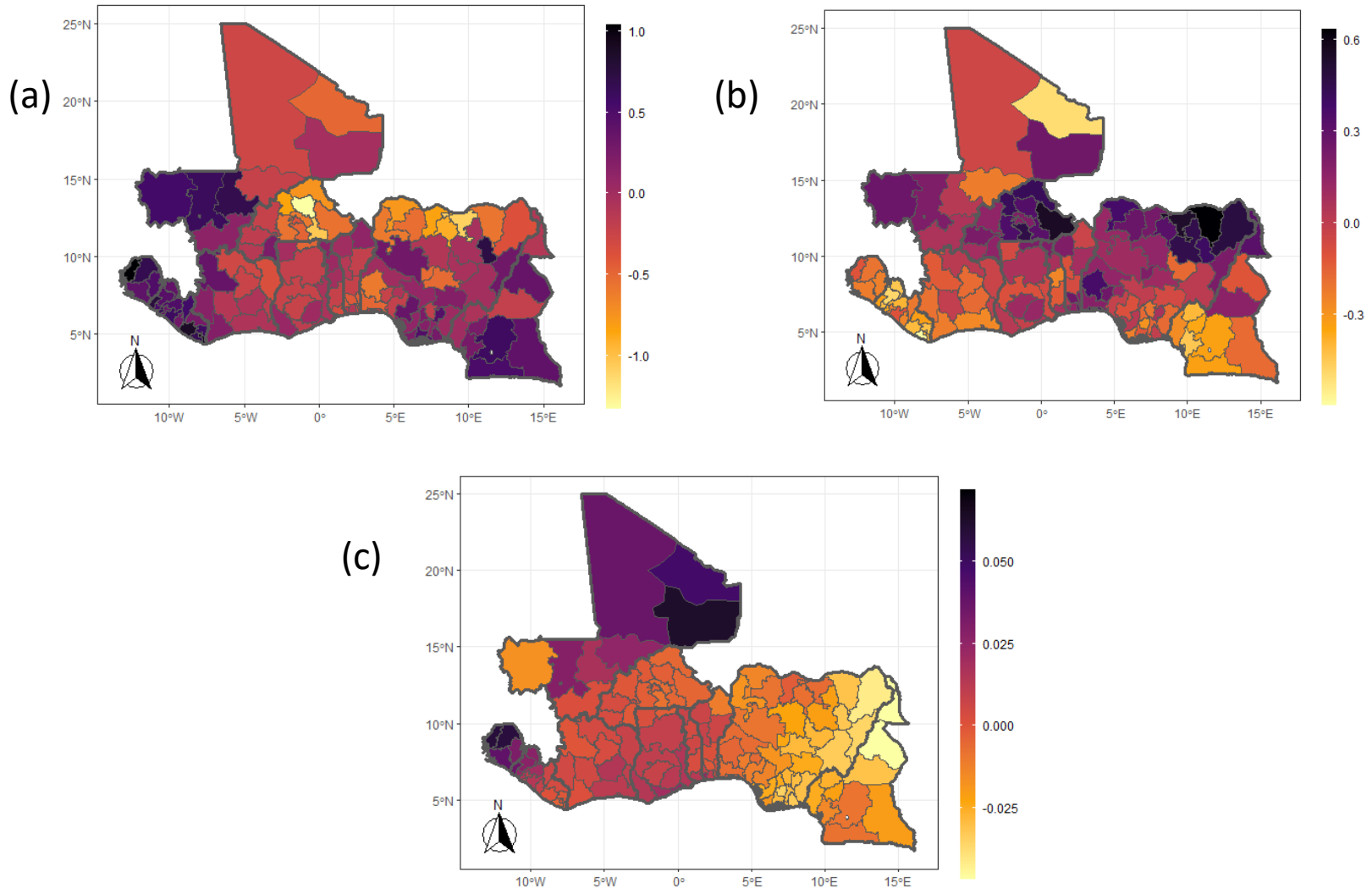

Fig. 6: Spatial effects for (a) physical violence, (b) underweight, and (c) correlation

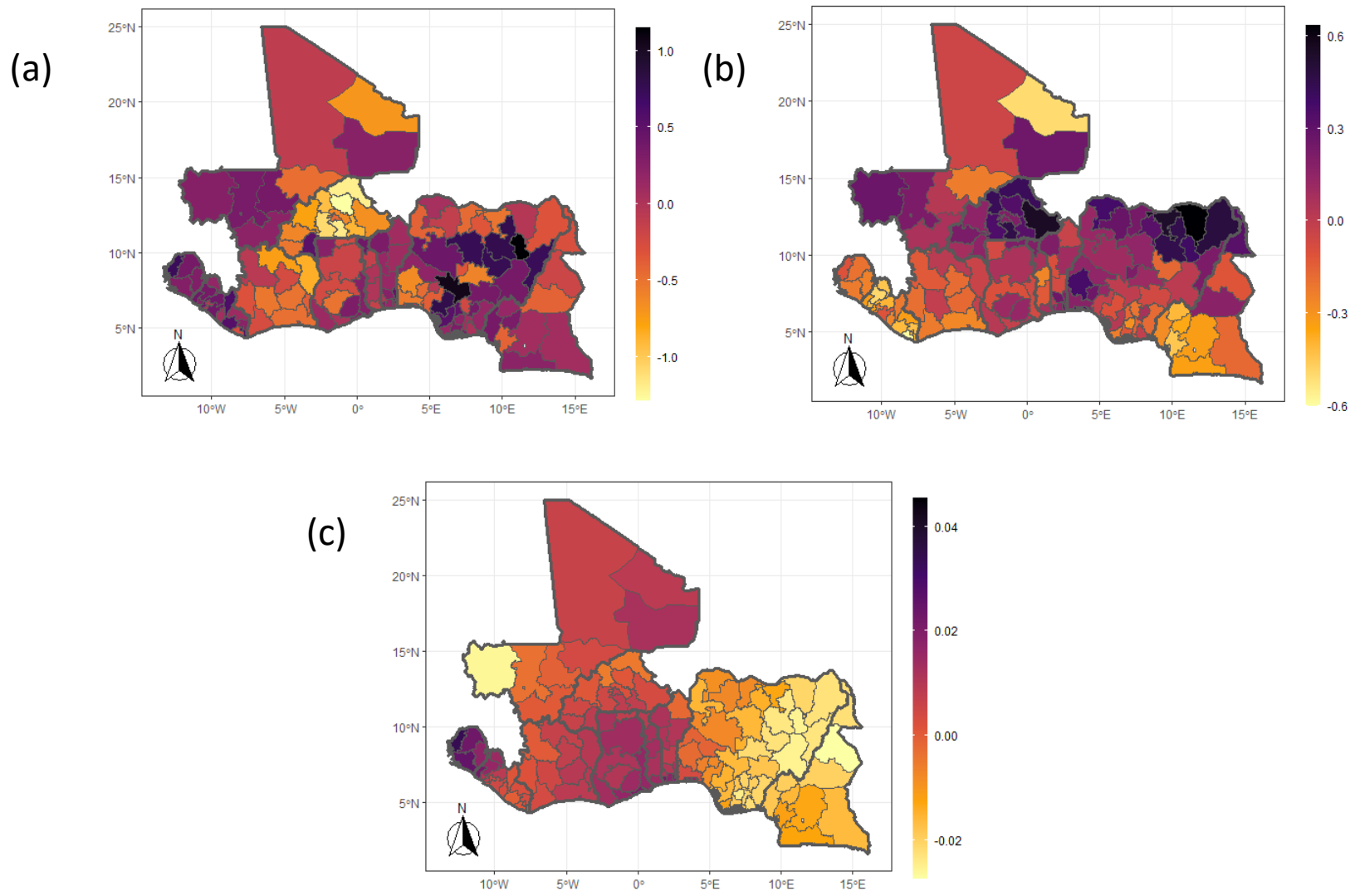

Fig. 7: Spatial effects for (a) emotional violence, (b) underweight, and (c) correlation

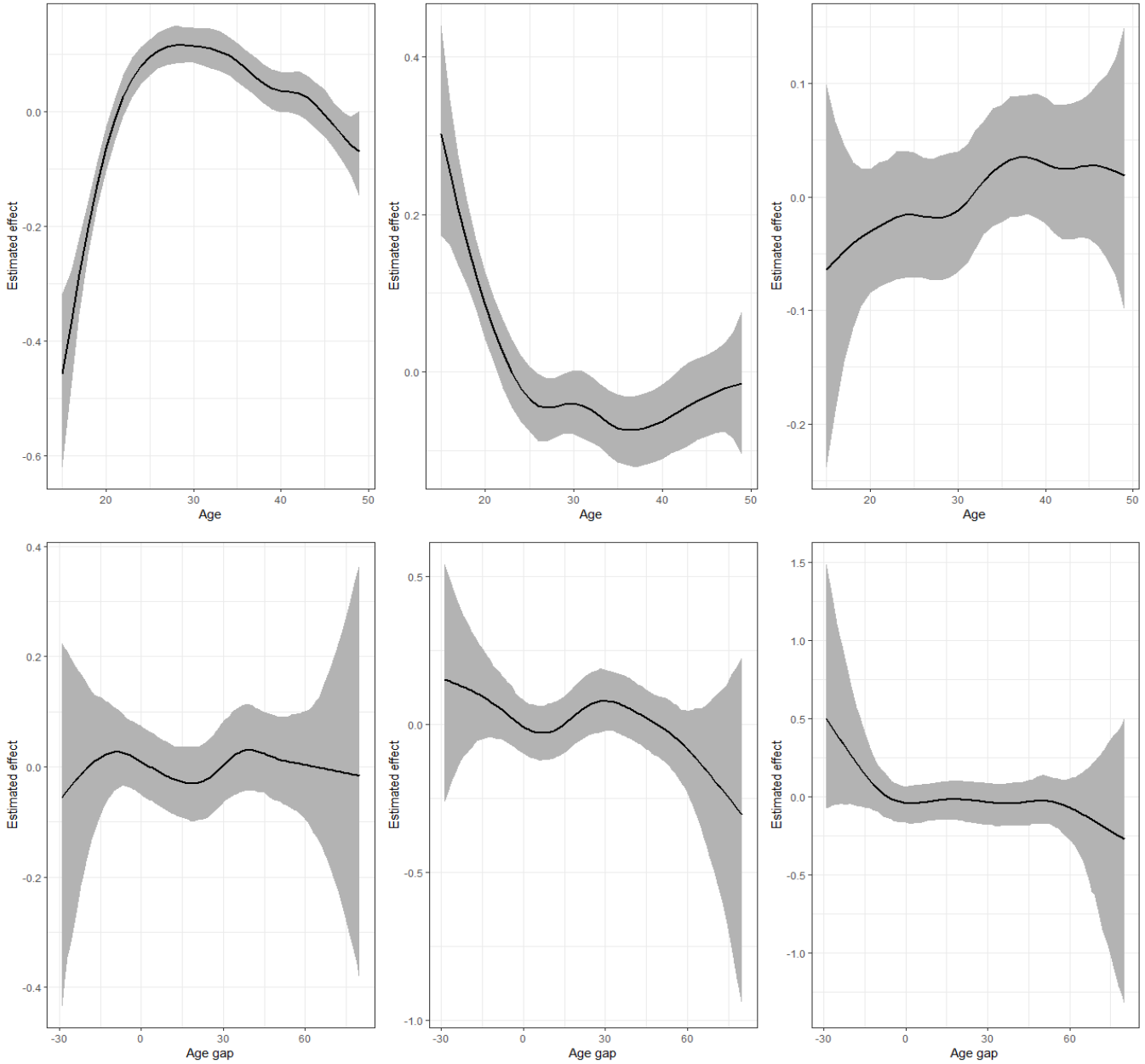

Fig. 8: Nonlinear effects of age (upper) and age gap (lower) for IPV and underweight

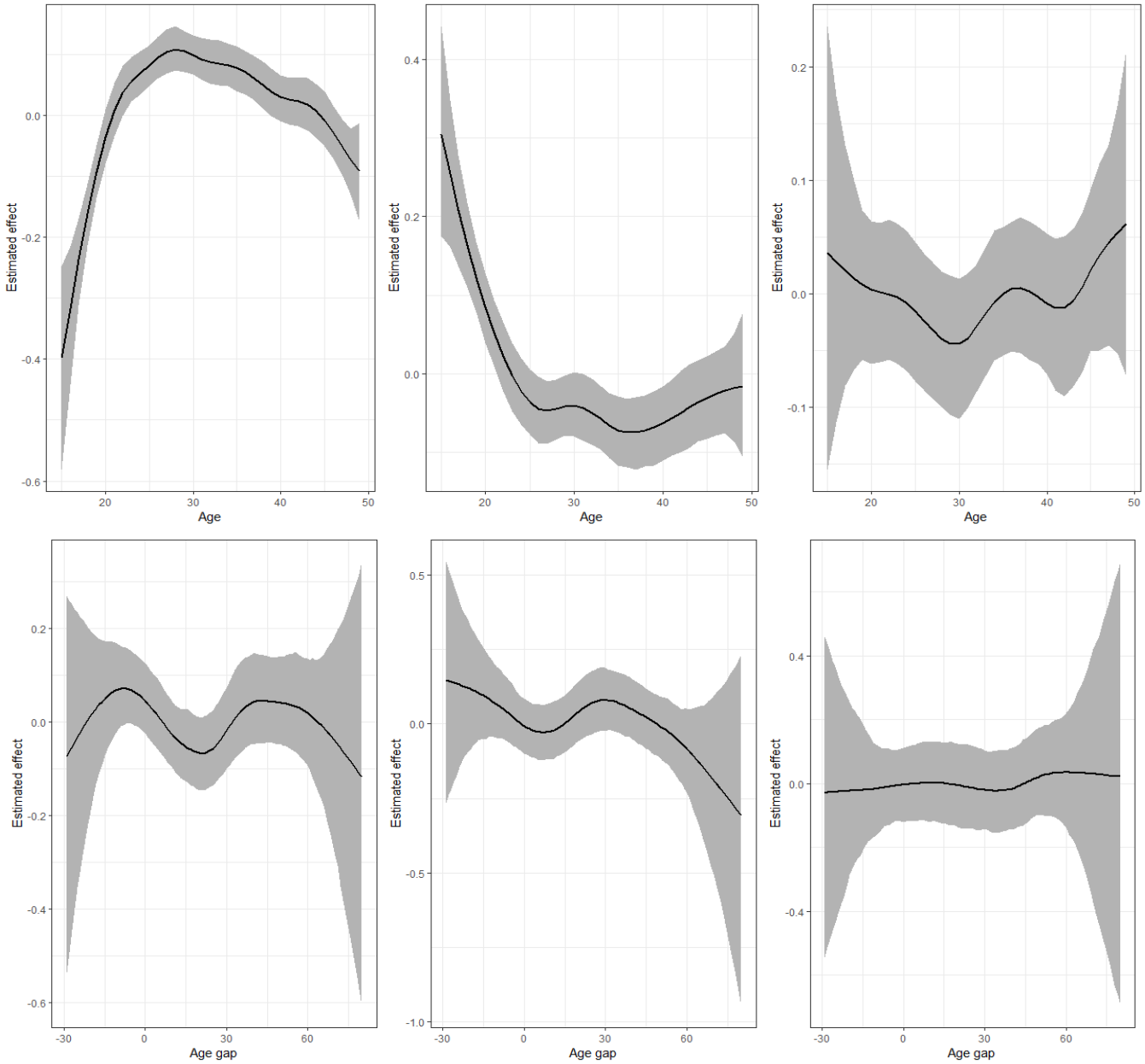

Fig. 9: Nonlinear effects of age (upper) and age gap (lower) for physical violence and underweight

Table 2: Posterior estimate for the linear effects for IPV and underweight

Variables	IPV		Underweight		Correlation	
	Mean	CrI	Mean	CrI	Mean	CrI
Residence						
Urban	0.008	-0.029, 0.045	-0.058	-0.115, 0.002	-0.020	-0.092, 0.050
Education						
None	0		0		0	
Primary	0.114	0.075, 0.153	-0.131	-0.194, -0.073	0.044	-0.030, 0.121
Secondary	0.050	0.007, 0.093	-0.080	-0.150, -0.015	-0.014	-0.099, 0.064
Higher	-0.249	-0.334, -0.161	-0.170	-0.330, -0.005	-0.158	-0.404, 0.065
Wealth index						
Poorest	0		0		0	
Poorer	-0.021	-0.064, 0.022	-0.087	-0.144, -0.031	0.057	-0.02, 0.134
Middle	-0.024	-0.071, 0.021	-0.186	-0.247, -0.123	-0.018	-0.106, 0.072
Richer	-0.082	-0.136, -0.035	-0.325	-0.401, -0.250	0.041	-0.063, 0.137
Richest	-0.248	-0.312, -0.182	-0.520	-0.620, -0.419	0.096	-0.037, 0.22
Employment						
Working	0.173	0.14, 0.208	-0.070	-0.122, -0.018	-0.034	-0.101, 0.036
Media access						
Newspaper	-0.044	-0.098, 0.012	-0.051	-0.146, 0.050	-0.071	-0.207, 0.062
Radio	0.059	0.031, 0.092	-0.037	-0.08, 0.009	0.043	-0.017, 0.101
Television	0.024	-0.013, 0.063	-0.050	-0.104, 0.005	-0.010	-0.086, 0.067

Conclusion

- Strong spatial clustering of IPV and the underweight indicators exist within and across the West African countries.
- Strong clustering of IPV in Liberia, Sierra Leone, parts of Mali, Central and Southern Nigeria spanning through southern Cameroon
- Underweight is clustered in northern Nigeria extending to northern Cameroon and throughout Burkina Faso.

Conclusion

- There is a positive linear relationship between IPV and underweight among women of most parts of Mali, Sierra Leone and Liberia extending to neighbouring Cote d'Ivoire, Ghana, and Togo

- With rising age, the relationship between IPV and underweight becomes positive


Thank you
a ni kié
Nouari
Barka
Nagode
Tenki
Nouari
Medaase
Enachè nuwe
Imela
Adupe
Minkari
Ni zúo
Akpe
Ayùe
Me yéga
Merci