**Abstract**

**Objective** To investigate the socioeconomic differentials underlying Minimum Dietary Diversity (MDD) among children aged 6-23 months in three economically-diverse Southeast Asian countries.

**Design** The outcome variable MDD was defined as the proportion of children aged 6 to 23 months who received foods from four of the seven recommended food groups within the 24 hours prior to interview. The association between socioeconomic factors and MDD, adjusting for relevant characteristics, was examined using logistic regression.

**Setting** We used cross-sectional population data from recent Demographic and Health Surveys from Cambodia (2014), Myanmar (2015-16) and Indonesia (2012).

**Subjects** Total of8,364 children aged 6-23 months.

**Results** Approximately half of all children met the MDD, varying from 47.7% in Cambodia (*n*=1,023), 58.2% in Indonesia (*n*=2,907) and 24.6% in Myanmar (*n*=301). The likelihood of meeting MDD increased for children in the richest households (Cambodia (aOR: 2.4, 95%CI: 1.7-3.4), Myanmar (aOR: 1.8, 95%CI: 1.1-3.0), Indonesia (aOR: 2.0, 95%CI: 1.6-2.5)), and those residing in urban areas (Cambodia (aOR: 1.4, 95%CI: 1.1-1.9), Myanmar (aOR: 1.7, 95%CI: 1.2-2.4), Indonesia (aOR: 1.7, 95%CI: 1.5-1.9)). MDD deprivation was most severe amongst children from the poorest households in rural areas. The association between mother’s labour force participation and MDD was positive in all three countries, but reached significance only in Indonesia (aOR: 1.3; 95%CI: 1.1, 1.5).

**Conclusions** MDD deprivation among young children was significantly high in socioeconomically disadvantaged families in all three study settings. MDD requirements are not being met for approximately half of young children in these three Southeast Asian countries.

**Keywords**: Young children, Minimum Dietary Diversity (MDD), Socioeconomic, DHS Surveys, Southeast Asia.

**Introduction**

Optimal nutrition during early life improves child survival(1)  and reduces risk of chronic, lifestyle-related diseases(2–6). Despite strong economic growth(7) and steady reductions in under-5 mortality in Southeast Asia(8), child malnutrition continues to pose a serious public health challenge, with parts of the region now facing a double burden of malnutrition, with increasing rates of overweight and obesity as well as persistent under-nutrition in children aged under five years(9).

Globally, 3.1 million under-five children die each year because of poor nutrition(10). The first two years of a child’s life are the most sensitive period to growth faltering(11,12) and Infant and Young Child Feeding (IYCF) practices should adapt to evolving nutritional needs(5).Exclusive breastfeeding is recommended for the first six months of life, and appropriate complementary feeding between the ages of 6–23 months(12). Further, adequate dietary diversity in early life may influence taste preference and dietary choice in adolescence and early adulthood(13,14).

Dietary diversity increases the intake of micronutrients and energy in young children(15,16). Minimum dietary diversity (MDD) is defined as the consumption of at least four out of seven food groups: grains, roots, tubers; legumes and nuts; dairy products; meats and fish; eggs; vitamin-A rich fruits and vegetables; and other fruits and vegetables(17). Whilst 60% of children aged 6–23 months in the Southeast Asia region meet the MDD, the dietary diversity gap between rich and poor is the starkest globally(5). Furthermore, dietary diversity is a particular concern due to the traditionally rice-based and vegetarian diets which contribute to micronutrient deficiencies throughout the region, specifically iron, zinc, vitamin A, iodine and calcium deficiencies(18).

The associations between socioeconomic status and growth during childhood have been well documented(15,19,20),with children from the richest households and usually those residing in urban areas typically exhibiting better growth; little is known about intra-urban and intra-rural socioeconomic disparities. It is predicted that, by 2050, 64% of the region’s population will live in urban areas(21),which has the potential to exacerbate intra-urban socioeconomic differentials in child nutritional status. In addition, with over two-thirds of females active in employment in this region, investigating the relationship between maternal employment and MDD in countries experiencing rapid urban transformation is a current and pressing issue(22).

We examine the socioeconomic differentials in minimum dietary diversity among children aged 6-23 months in three economically diverse countries of Southeast Asia: Cambodia, Myanmar and Indonesia, which together account for 51% of the total population of Southeast Asia(23). Myanmar and Cambodia are low-income countries(24) with just over one-third of children under five years stunted – one of the highest among all ASEAN countries(9), and under-five mortality rates which would need to be reduced further to meet the 2030 target(25). Indonesia is the most populated lower-middle income country in the region, with a per-capita income approximately three times that of the other two countries(23) and confronted with both increasing obesity and persistent high rates of stunting in children under-5(26).Indonesia is close to achieving the 2030 target of under-5 mortality with 26 deaths per 1,000 live births (25). All three countries are committed to achieving the UN Sustainable Development Goal (SDG-2) for ending all forms of malnutrition among children under-5 by 2030 through improved food security, nutrition and sustainable agricultural production(10).

To the best of our knowledge, there are no systematic cross-national or sub-regional analyses

of factors associated with dietary diversity amongst young children in Southeast Asia. Analysing data from three economically and culturally diverse countries in this sub-region, we identify the cross-country similarities and differences in factors associated with infant feeding practices and dietary diversity and contribute to strengthening the evidence-base for policy makers at both the national and sub-regional level.

We hypothesised that (a) socioeconomic differences exist in MDD requirements among children under-five and (b) the poorest children in rural areas are the most vulnerable to MDD deprivation than their urban counterparts.

**Methodology**

Data for this study were drawn from the individual women’s questionnaire from most recent Demographic and Health Surveys from Cambodia(27) (2014), Myanmar(28) (2015-16) and Indonesia(29) (2012). All eligible mothers were asked about the types of food given to their youngest child aged under three years in the day and night prior to survey(30), according to food groups as classified by WHO(17). Mothers were read a list of different food types and were asked to respond ‘yes’ if the child had received the food item in the previous day or night, even if this food type was combined with other items. In addition, the surveys collected data on the household, socioeconomic and demographic characteristics.

The analysis was based on one eligible woman per household reporting on her youngest, singleton child aged 6-23 months, living with their mother at the time of survey. Total sample size ranged from 2,127 children in Cambodia, 1,339 in Myanmar and 5,193 in Indonesia. DHS surveys employed a standard stratified two-stage cluster probability sampling to identify households and respondents who are eligible for interview. The eligible respondents, women aged 15-49 years, were selected randomly from the sampled households within each cluster. Further details on DHS sampling design and survey methodology can be found in the relevant DHS reports for each country(27-29). The women response rate in the survey was 98% in Cambodia, 96% in Indonesia and 96% in Myanmar. The item non-response for selected explanatory variables was minimal, and those with missing data at random were removed from the final analysis (<2% of all cases).

Minimum dietary diversity (MDD) was defined as the proportion of children aged 6 to 23 months who received foods from four out of seven recommended food groups within the 24 hours prior to interview(17).

Factors potentially associated with infant dietary diversity were identified based on the literature on complementary feeding in Southeast Asia(31–34) and with reference to the WHO conceptual framework(35).We defined socioeconomic status at the level of the individual (mothers’ education and level of participation in the labour force), household (wealth quintile) and spatial (urban-rural residence and geographical region). A composite indicator was created for female labour force participation using principal component analysis(36), which transformed five individual variables into one indicator, to account for different aspects of employment. These five variables included employment status in the past 12 months, who the mother reported working for, her occupation, type of earnings and whether she was employed all year, seasonally or occasionally. A household wealth index was also calculated separately for urban and rural areas using principal component analysis, to ensure that those from the poorest households in rural areas were effectively captured. In each country, the geographical regions were re-grouped to reduce the number of categories (**Table 1**).

Child characteristics included age in years, sex, birth order, birth interval and birth weight. In addition, we considered morbidity status of the child, defined as any symptoms of acute respiratory infection (ARI), diarrhoea or fever in the two weeks preceding the survey. Maternal characteristics included age in years, marital status and number of antenatal visits. Sex of household head was included as a household characteristic. Maternal media exposure was computed using principal component analysis, which included how often the respondent read newspapers, listened to radio or watched television; the composite index was categorised as frequent, moderate and limited exposure.

We identified two relevant paternal characteristics likely to be associated with children’s MDD requirement. These included father’s highest education level achieved, and his type of occupation (agricultural employment, non-agricultural employment and unemployed).

**Statistical analysis**

We used STATA 14.0 for the statistical analysis(37). Descriptive statistics were calculated taking into account of the complex survey design and applying relevant sample weights. The outcome variable was Minimum dietary diversity (MDD) categorized as a binary variable, coded 0 in cases where the child did not receive the MDD in the 24 hours prior to interview and 1 in cases where the child did receive the MDD. We initially considered a two level (individual and primary sampling unit or cluster) random intercept model to account for the hierarchical nature of the dataset. However, there was no difference in the outcome variable at the cluster level due to small sample size, and hence we considered a fixed effect binary logistic regression for the multivariate analyses.

The variables that were significantly associated with the outcome variable in the bivariate analysis were included in the final multivariable logistic model. The model-building procedure considered a sequential approach selecting variables, reflecting on evidence from existing studies. During this iterative process, variables that were not significant in the multivariable model were removed and added one by one to measure their effect on the other covariates. The most parsimonious model for all three countries was determined using the Hosmer Lemeshow test for goodness of fit. In order to maintain comparability between models, the same explanatory variables were used for each country. Collinearity between variables was tested for using variance inflation factors (VIFs) which measures the strength of pairwise correlations between variables. The final results were presented as adjusted odds ratios (AOR), with 95% confidence intervals (CI).

Interactions based on theoretical assumptions were tested (between urban/rural residence and wealth; and urban/rural residence and mother’s education). However, these were found to be insignificant and were thus excluded from the final adjusted models.

**Results**

Of the total 8364 children, approximately half were girls (49.3% in Cambodia, 48.5% in Indonesia and 46.2% in Myanmar). In Myanmar, 21.4% of children were fourth or higher births, in Cambodia 15.9% and Indonesia 12.7%. Just under half of children were reported with at least one symptom of morbidity in Cambodia and Indonesia, and a third of children in Myanmar.

Cambodia had the highest proportion of children whose mothers were aged between 15 and 24 years (34.9%), whilst this accounted for 28.1% of children in Indonesia and 25.2% of children in Myanmar. In all three countries, the proportion of mothers not currently in a partnership or marriage was below 5%. The percentage of mothers who had achieved secondary or higher education was significantly higher in Indonesia (68.2%) than in Cambodia (36.2%) and Myanmar (40.2%). In Cambodia, 61.3% of mothers reported to be currently working, 52.0% in Myanmar and 41.1% in Indonesia. Only 1.0% of fathers in Indonesia had no formal education, 8.8% in Cambodia and 16.1% in Myanmar; and over three-quarters were reported to be working in agricultural occupations in Myanmar and Indonesia, whilst in Cambodia this accounted for just over half of fathers.

The majority of children in Cambodia (86%) and Myanmar (74.6%) resided in rural areas, in contrast to Indonesia where approximately equal proportions resided in urban and rural areas **(Table 2)**.

**Dietary Diversity**

Overall, the proportion of children aged 6-23 months reported to be receiving MMD ranged from 24.6% in Myanmar, to 47.7% in Cambodia and 57.9% in Indonesia (**Figure 1**).

Foods consisting of grains, roots and tubers feature in the diets of children in all three countries, with over 50% of children in Cambodia and Myanmar receiving this type of food at six or seven months respectively, and over 83% in Indonesia by age six months. (**Figure S1**, Supplementary Material). Flesh foods such as meat and poultry featured in the diets of over half of Cambodian children aged 6-11 months old, increasing to 94% by age 18-23 months. However, only one third of children aged 6-11 months in Myanmar and Indonesia received flesh foods which increased to 60% in Myanmar and 70% in Indonesia by age 18-23 months.

**Factors associated with MDD**

Pooling all data from Cambodia, Myanmar and Indonesia (**Table S1**, Supplementary Material) to quantify the difference between countries in the likelihood of children meeting MDD, with Cambodia as reference category, the odds of meeting MDD was 68% lower (aOR 0.32, 95%CI: 0.27, 0.38) in Myanmar and 22% higher in Indonesia (aOR 1.22, 95%CI: 1.08, 1.38). In this pooled analysis, children from the richest households (aOR 2.78, 95%CI: 2.36, 2.29) and those living in urban areas (aOR 1.83, 95%CI: 1.64, 2.04) were more likely to meet the MDD. High labour force participation was associated with a 25% increased odds of meeting MDD (aOR 1.25, 95%CI:1.10, 1.42).

**Country level models**

In both Myanmar and Indonesia, children of mothers with secondary education or higher were more likely to receive MDD (aOR 1.39, 95%CI 1.00, 1.94 and aOR 1.37, 95%CI 1.20, 1.61 respectively), but this association did not reach statistical significance in Myanmar (**Table 3**). Mother’s level of labour force participation was only significantly associated with MDD in Indonesia, with infants of mothers with high participation in the labour force having increased odds of meeting MDD (aOR 1.28, 95%CI 1.06, 1.53), whereas this association, although in the same direction, did not reach statistical significance in Cambodia and Myanmar.

Consistently, children from the richest households experienced increased odds of receiving the minimum dietary diversity, by approximately two-fold or more in each country, whilst living in an urban area increased the odds (aOR 1.43, 95%CI 1.10, 1.88) in Cambodia, (aOR 1.69, 95%CI 1.18, 2.42) in Myanmar and (aOR: 1.66, 95%CI 1.45, 1.90) in Indonesia. Further exploration of the predicted probabilities for children receiving MDD across household wealth quintile, by urban/rural residence (see **Table S2** and **Figure S2**, Supplementary Material), provided insight into intra-urban and intra-rural socioeconomic differentials in meeting MDD. Although the differences between the predicted probabilities between children from the poorest and richest households were relatively similar amongst both urban and rural children, it was clear that the rural poor were consistently disadvantaged, compared to the urban poor.

By geographical region, children residing in households outside of the capital city of Phnom Penh in Cambodia, experienced decreased odds of meeting MDD. In Myanmar, residing in central Myanmar (in the regions of Magway, Mandalay and Naypyitaw) was associated with increased odds of receiving MDD of approximately two folds (aOR: 2.26, 95%CI: 1.38, 3.71).

In all three countries children aged 18-23 months were over three times more likely to receive the MDD than those aged 6-11 months. In Myanmar, being a girl was associated with a 30% decreased odds of meeting MDD (aOR: 0.70, 95%CI: 0.52, 0.93), but this association was minimal and not statistically significant in Cambodia and Indonesia.

In all three countries, children who were still being breastfed at the time of the survey were significantly less likely to receive the MDD, with decreased odds of 27% in Cambodia, 39% in Myanmar and 51% in Indonesia, in models adjusting for age of child. Reported symptoms of recent child morbidity increased the odds of meeting MDD in Indonesia by 25% (aOR: 1.25, 95%CI: 1.10, 1.42), but this association was not significant in Cambodia where the odds were decreased and in Myanmar where the odds were increased. A short preceding birth interval (<24 months) was associated with decreased odds of the child receiving MDD in both Cambodia and Myanmar, by approximately half.

Children of mothers in the youngest age category (15-24 years) were most at risk for not meeting MDD in all three countries. The association between a composite measure of maternal exposure to media and MDD differed in Cambodia and Indonesia; with limited exposure reducing the odds of meeting MDD by 40% in Cambodia and a non-significant 26% in Myanmar to increasing the odds by 58% in Indonesia.

**Discussion**

The findings of our research confirm that urban areas offer advantage over rural for meeting minimum dietary diversity in young children(38), although intra-urban and intra-rural socioeconomic differentials remained.

The finding that maternal higher education was positively associated with MDD in Myanmar and Indonesia is supported by previous research in the Asia-Pacific region(31,39–42). Although maternal education is often considered a proxy for socioeconomic status, Ruel et al.,(43) argue that the effect of maternal education on child health and nutrition is independent of socioeconomic status, perhaps strengthening the guidance to improve maternal knowledge of optimal child nutrition. Although mother’s labour force participation only reached significance in Indonesia, in all countries children of mothers with a high labour force involvement had an increased likelihood of meeting MDD. Rates of female labour force participation vary across the 6,000 islands that constitute Indonesia, but have on the whole remained relatively high compared to other countries in Southeast Asia(44). Moreover, even among women participating in the labour force, only a very small proportion of women are formally employed in wage jobs (44). Our findings highlight that children born to mothers actively engaged in labour force in Indonesia, i.e. high-status employment in professional or skilled jobs, with job security, year-round employment and wages, were more likely to receive MDD. Unlike previous studies which considered the employment status (whether or not the mother was employed), our study used a composite indicator to understand the effect of maternal labour force participation on dietary diversity in children. This clearly suggests the importance of considering multiple dimensions of female participation in the labour force. This is especially pertinent in countries where many women participate in informal or seasonal employment.

At the household level, in a model allowing for urban/rural setting, there was consistent inequality in the odds of meeting MDD by household wealth quintile in all three countries, with children from the poorest households most at risk of not receiving the MDD, also shown elsewhere in low- and middle-income countries(41,40,39,42). We also show a clear link between living in an urban area and improved odds for meeting MDD in children, in a model controlling for maternal education and household wealth. The role of urbanization is important in Southeast Asia, a region where 47% of the population were living in urban areas in 2014, expected to rise to 64% by 2050(21). Urbanization and the concurrent growth in incomes, employment opportunities and lower food prices perhaps provides advantage over rural areas, where there is a higher dependence on sometimes unpredictable natural resources to meet nutritional needs and lack of national integrated systems for food distribution(38).

Finally, we also found that girls were disproportionately at risk of not meeting MDD in Myanmar, despite previous research suggesting no gender differences in IYCF practices in this country(45). Our findings also highlight the need to focus on increasing IYCF knowledge amongst younger mothers(46). This is particularly pertinent in the Southeast Asia region where adolescent birth rates remain high(47) and 17.4% of the population is made up of those aged between 15 and 24 years(48). Regular media exposure had a positive effect on meeting MDD in Cambodia, perhaps reflective of the successfulness of the *COMBI* national campaign 2011-2013 to improve complementary feeding(49).

There are some methodological limitations of our study to consider. Limited sample sizes and consequent lack of disaggregated statistics prevented stratified modelling by breastfeeding status; as breast milk is not included in the itemised food groups, it is thus likely that MDD was underestimated amongst the sub-group of children who were still breastfed(17). Although the use of current-status data may result in overestimating the proportion of children meeting MDD(50), use of such data is considered to strengthen the reliability of survey responses due to the reduced recall bias. Finally, high response rates in each country (over 96% amongst contacted women) demonstrate the value of DHS data for population-level analysis.

**Conclusion**

We confirm the role of urban-rural setting in complementary feeding practices of young children, and further show that socioeconomic characteristics of households, mothers and children within both urban and rural areas are influential factors in meeting MDD. Using nationally representative data from three countries in Southeast Asia, we have shown that the poorest households in both rural and urban areas are consistently the most disadvantaged and this result is consistent across the sub-region. Using a stratified wealth index that was calculated separately for urban and rural areas, we have tried to ensure that those from the poorest households in rural areas were effectively represented in this study.

Regardless of location, children of mothers with higher education, better working conditions and higher economic status were more likely to receive MDD. As a result, policies to promote dietary diversity in young children should not only focus on geographical differences, but also target population sub-groups from economically disadvantaged communities. Today’s children will become adults by the end of 2030. Therefore, investing in child nutrition and thus development is crucial for achieving Goal 2 and 3 of the 2030 Agenda for Sustainable Development(5).

**References**

[1] Black RE, Allen LH, Bhutta ZA *et al.* (2008) Maternal and child undernutrition: global and regional exposures and health consequences. *Lancet* **371**, 5-22.

[2] Victora CG, Adair L, Fall C *et al.* (2008) Maternal and child undernutrition: consequences for adult health and human capital. *Lancet***371,** 340-57.

[3] Horta BL & Victora CG (2013) Long-term effects of breastfeeding, A systematic review. Geneva: World Health Organization. http://apps.who.int/iris/bitstream/10665/79198/1/9789241505307\_eng.pdf?ua=1 (accessed December 2017).

[4] Black RE, Victora CG, Walker SP *et al.* (2013) Maternal and child undernutrition and overweight in low-income and middle-income countries. *Lancet* **382**, 1-25.

[5] UNICEF (2016) From the first hour of life: Making the case for improved infant and young child feeding everywhere. New York:UNICEF. https://data.unicef.org/wp-content/uploads/2016/10/From-the-first-hour-of-life-1.pdf (accessed December 2017).

[6] Gluckman PD, Hanson MA, Bateson P *et al.* (2009) Towards a new developmental synthesis : adaptive developmental plasticity and human disease. *Lancet***373**, 1654-57.

[7] World Bank Group (2017) World Bank East Asia and Pacific Economic Update October 2017, Balancing Act. Washington DC: World Bank Group. https://openknowledge.worldbank.org/bitstream/handle/10986/28396/9781464812095.pdf?sequence=4&isAllowed=y (accessed January 2018).

[8] United Nations ESCAP (2017) Statistical Yearbook for Asia and the Pacific 2016: SDG Baseline Report. Bangkok:United Nations ESCAP. http://www.unescap.org/sites/default/files/ESCAP\_SYB2016\_SDG\_baseline\_report.pdf (accessed December 2017).

[9] ASEAN/UNICEF/WHO (2016) Regional Report on Nutrition Security in ASEAN, Volume 2. Bangkok: UNICEF/ASEAN/World Health Organization. https://www.unicef.org/eapro/Regional\_Report\_on\_Nutrition\_Security\_in\_ASEAN\_%28Volume\_2%29.pdf (accessed December 2017).

[10] United Nations (2018) Goal 2: End hunger, achieve food security and improved nutrition and promote sustainable agriculture. http://www.un.org/sustainabledevelopment/hunger/ (accessed February 2018).

[11] Uauy R, Kain J, & Corvalan C (2011) How can the Developmental Origins of Health and Disease ( DOHaD ) hypothesis contribute to improving health in developing countries? *Am J Clin Nutr* **94**, Suppl. 6, S1759-64.

[12] World Health Organization (2013) Essential Nutrition Actions : improving maternal, newborn, infant and young child health and nutrition. Geneva: World Health Organization. http://apps.who.int/iris/bitstream/10665/84409/1/9789241505550\_eng.pdf?ua=1 (accessed December 2017).

[13] Beauchamp GK & Mennella JA (2009) Early flavor learning and its impact on later feeding behavior. *J. Pediatr. Gastroenterol*. *Nutr* **48**, Suppl. 1, S25-30.

[14] Nicklaus S, Boggio V, Chabanet C *et al.* (2005) A prospective study of food variety seeking in childhood, adolescence and early adult life. *Appetite* **44**, 289-97.

[15] Hoddinott J & Yohannes Y (2002) Dietary Diversity as a Food Security Indicator. Washington D.C: Food and Nutrition Technical Assistance Project, Academy for Educational Development. http://pdf.usaid.gov/pdf\_docs/Pnacq758.pdf (accessed December 2017).

[16] Onyango A, Koski KG & Tucker KL (1998) Food diversity versus breastfeeding choice in determining anthropometric status in rural Kenyan toddlers. *Int. J. Epidemiol* **27**, 484-89.

[17] World Health Organization (2008) Indicators for assessing infant and young child feeding practices: conclusions of a meeting held 6-8 November 2007 in Washington D.C., USA. Geneva: World Health Organization http://apps.who.int/iris/bitstream/10665/43895/1/9789241596664\_eng.pdf (accessed November 2017).

[18] Chaparro C, Oot L & Sethuraman K (2014) Overview of the Nutrition Situation in Seven Countries in Southeast Asia. Washington, D.C: FANTA. https://www.fantaproject.org/sites/default/files/download/Southeast-Asia-Nutrition-Overview-Apr2014.pdf (accessed November 2017).

[19] Srinivasan CS, Zanello G & Shankar B (2012) Rural-urban disparities in child nutrition in Bangladesh and Nepal. *BMC Public Health* **13**, 581.

[20] Van De Poel E, Hosseinpoor AR, Speybroeck N *et al.* (2008) Socioeconomic inequality in malnutrition in developing countries. *Bull. World Health Organ* **86**, 282-91.

[21] United Nations (2014) World Urbanization Prospects: The 2014 Revision, Highlights. New York: United Nations, Department of Economic and Social Affairs, Population Division; 2014. https://esa.un.org/unpd/wup/publications/files/wup2014-highlights.pdf (accessed February 2018).

[22] ASEAN (2015) Women in the Workforce: An Unmet Potential in Asia and the Pacific. Mandaluyong City: ASEAN. https://www.adb.org/sites/default/files/publication/158480/women-workforce-unmet-potential.pdf (accessed January 2018).

[23] United Nations ESCAP (2018) UNESCAP Statistical Database. http://data.unescap.org/escap\_stat/#compareData (accessed February 2018).

[24] United Nations ESCAP (2018) UNESCAP Statistical Database: Methods and Definitions. http://data.unescap.org/escap\_stat/#methodDefinition (accessed February 2018).

[25] UNICEF (2017) Under-five mortality, Current Status + Progress. https://data.unicef.org/topic/child-survival/under-five-mortality/ (accessed February 2018).

[26] UNICEF/World Health Organization/World Bank (2017) Joint Child Malnutrition Estimates: Country level. https://data.unicef.org/topic/nutrition/malnutrition/ (accessed January 2018).

[27] Cambodia Demographic and Health Survey 2014 [Dataset] KHKR73FL.DTA. Phnom Penh and Rockville, Maryland: National Institue of Statistics, Directorate General for Health, and ICF International; 2015.

[28] Myanmar Demographic and Health Survey 2015-16 [Dataset]. MMKR71FL.DTA. Nay Pyi Taw and Rockville, Maryland: Ministry of Health and Sports (MoHS) and ICF International; 2017.

[29] Indonesia Demographic and Health Survey 2012 [Dataset]. IDKR63FL.DTA. Jakarta and Rockville, Maryland: Statistics Indonesia (Badan Pusat Statistik-BPS), National Population and Family Planning Board (BKKBN), Kementerian Kesehatan (Kemenkes-MoH), and ICF International; 2013.

[30] USAID (2015) Demographic and Health Surveys, Model Woman’s questionnaire (Phase-7) https://dhsprogram.com/pubs/pdf/DHSQ7/DHS7-Womans-QRE-EN-07Jun2017-DHSQ7.pdf. (accessed February 2018).

[31] Ng CS, Dibley MJ & Agho KE (2012) Complementary feeding indicators and determinants of poor feeding practices in Indonesia: a secondary analysis of 2007 Demographic and Health Survey data. *Public Heallth Nutr* **15**, 1-13.

[32] Dibley MJ, Senarath U & Agho KE (2010) Infant and young child feeding indicators across nine East and Southeast Asian countries : an analysis of National Survey Data 2000 – 2005. *Public Health Nutr*. **201**, 1296-1303.

[33] Hlaing LM, Fahmida U, Htet MK *et al.* (2016) Local food-based complementary feeding recommendations developed by the linear programming approach to improve the intake of problem nutrients among 12-23-month-old Myanmar children. *Br. J. Nutr***116**, Suppl. 1, S16-26.

[34] Diana A, Mallard SR, Haszard JJ *et al.* (2017) Consumption of fortified infant foods reduces dietary diversity but has a positive effect on subsequent growth in infants from Sumedang district, Indonesia. *PLoS ONE* **12** (4): e0175952.

[35] Stewart CP, Iannotti L, Dewey KG *et al.* (2013) Contextualising complementary feeding in a broader framework for stunting prevention. *Matern. Child Nutr* **9**, Suppl. 2, 27-45.

[36] Sebayang SK, Efendi F & Astutik E (2017) DHS WORKING PAPERS Women’s Empowerment and the Use of Antenatal Care Services in Southeast Asian Countries. Rockville, Maryland: USAID https://www.dhsprogram.com/pubs/pdf/WP129/WP129.pdf (accessed January 2018).

[37] StataCorp (2015) Stata Statistical Software: Release 14 [Software]. College Station, TX: StataCorp LP.

[38] Popkin BM (1999) Urbanization, lifestyle changes and the nutrition transition. *World Dev* **27**, 1905-16.

[39] Na M, Aguayo VM, Arimond M *et al.* (2017) Risk factors of poor complementary feeding practices in Pakistani children aged 6-23 months: A multilevel analysis of the Demographic and Health Survey 2012-2013. *Matern. Child Nutr* **13**, Suppl. 2: e12463.

[40] Patel A, Pusdekar Y, Badhoniya N *et al.* (2012) Determinants of inappropriate complementary feeding practices in young children in India : secondary analysis of National Family Health Survey 2005 – 2006. *Matern Child Nutr* **8**, Suppl.1, 28-44.

[41] Kabir I, Khanam M, Agho KE *et al.* (2012) Determinants of inappropriate complementary feeding practices in infant and young children in Bangladesh: secondary data analysis of Demographic Health Survey 2007. *Matern. Child Nutr* **8**, Suppl. 1, 11-27.

[42] Senarath U, Godakandage SSP, Jayawickrama H *et al.* (2012) Determinants of inappropriate complementary feeding practices in young children in Sri Lanka : secondary data analysis of Demographic and Health Survey 2006 – 2007. *Matern. Child Nutr* **8**, Suppl. 1, 60-77.

[43] Ruel MT, Levin CE, Armar-Klemesu M *et al.* (1999) Good care practices can mitigate the negative effects of poverty and low maternal schooling on children’s nutritional status: Evidence from Accra. *World Dev* **27**, 1993-2009.

[44] Schaner S & Das S (2016) Female Labor Force ParticIpation in Asia : Indonesia Country Study. Mandaluyong City: Asian Development Bank. https://www.adb.org/sites/default/files/publication/180251/ewp-474.pdf (accessed January 2018).

[45] Zhao A, Gao H, Li B *et al.* (2016) Inappropriate Feeding Behavior : One of the Important Causes of Malnutrition in 6- to 36-Month-Old Children in Myanmar. *Am. J. Trop. Med. Hyg* **95**, 702-08.

[46] Hackett KM, Mukta US, Jalal CSB *et al.* (2015) Knowledge, attitudes and perceptions on infant and young child nutrition and feeding among adolescent girls and young mothers in rural Bangladesh. *Matern. Child Nutr* **11**,173-89.

[47] World Health Organization (2016) Adolescent Birth Rate, Data by country 2016. http://www.who.int/gho/maternal\_health/reproductive\_health/adolescent\_fertility/en/ (accessed January 2018).

[48] United Nations (2017) World Population Prospects The 2017 Revision Key Findings and Advance Tables. New York: United Nations. https://esa.un.org/unpd/wpp/publications/Files/WPP2017\_KeyFindings.pdf (accessed January 2018).

[49] FAO (2015) Improving Complementary Feeding in North-Western Cambodia: Lessons learned from a Process review of a food security and nutrition project. Rome: FAO. http://www.fao.org/3/a-bc792e.pdf (accessed November 2017).

[50] Grummer-strawn LM (2011) Regression Analysis of Current-Status An Application to Breast-Feeding. *J. Am. Stat. Assoc* **88**, 758-65.

Figure 1 **Percentage of children aged 6-23 months consuming different food groups**

Table 1 **Geographical regions of the study context**

|  |  |  |  |
| --- | --- | --- | --- |
| **Geographical Region** | **Cambodia, 2014** | **Myanmar, 2015-16** | **Indonesia, 2012** |
| Region1 | Phnom Penh | North Myanmar | Sumatra |
| Region 2 | Plain | East Myanmar | Java |
| Region 3 | Tonle Sap | South Myanmar | Lesser Sunda Islands |
| Region 4 | Coast | West Myanmar | Kalimantan |
| Region 5 | Plateau/mountain | Lower Myanmar | Sulawesi |
| Region 6 |  | Central Myanmar | Maluku Islands |
| Region 7 |  |  | New Guinea |

Table 2 **Unadjusted percentages and 95% CIs showing the sample characteristics**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Characteristics** | **Cambodia (*n*=2,127)** | |  | **Myanmar (*n*=1,339)** | |  | **Indonesia, (*n*=5,193)** | |
| **%** | **95% CI** |  | **%** | **95% CI** |  | **%** | **95% CI** |
| **Child** |  |  |  |  |  |  |  |  |
| Age (months) |  |  |  |  |  |  |  |  |
| 6-11 | 34.8 | (32.3, 37.4) |  | 32.6 | (29.6, 35.8) |  | 36.1 | (34.2, 38.1) |
| 12-17 | 31.4 | (29.0, 34.0) |  | 37.2 | (34.0, 40.4) |  | 32.7 | (30.9, 34.6) |
| 18-23 | 33.8 | (31.3, 36.4) |  | 30.2 | (27.3, 33.3) |  | 31.2 | (29.4, 33.0) |
| Sex |  |  |  |  |  |  |  |  |
| Male | 50.7 | (48.0, 53.4) |  | 53.9 | (50.6, 57.1) |  | 51.5 | (49.5, 53.5) |
| Female | 49.3 | (46.6, 52.0) |  | 46.2 | (42.9, 49.4) |  | 48.5 | (46.5, 50.5) |
| Birth order |  |  |  |  |  |  |  |  |
| First-born | 40.0 | (37.4, 42.7) |  | 35.5 | (32.4, 38.8) |  | 38.3 | (36.4, 40.3) |
| Second to third | 44.1 | (41.5, 46.8) |  | 43.1 | (39.9, 46.3) |  | 49.0 | (47.0, 51.0) |
| Fourth or more | 15.9 | (13.9, 18.0) |  | 21.4 | (18.9, 24.1) |  | 12.7 | (11.6, 13.9) |
| Birth interval (months) |  |  |  |  |  |  |  |  |
| No previous birth | 40.5 | (37.9, 43.2) |  | 36.2 | (33.1, 39.4) |  | 38.7 | (36.8, 40.7) |
| <24 | 7.8 | (6.4, 9.4) |  | 7.3 | (5.8, 9.2) |  | 5.5 | (4.8, 6.4) |
| ≥24 | 51.7 | (49.0, 54.4) |  | 56.5 | (53.2, 59.8) |  | 55.7 | (53.8, 57.7) |
| Perceived birth weight |  |  |  |  |  |  |  |  |
| Smaller than average | 10.5 | (9.0, 12.3) |  | 12.3 | (10.3, 14.6) |  | 13.0 | (11.7, 14.4) |
| Average | 55.7 | (53.0, 58.3) |  | 60.9 | (57.6, 64.1) |  | 56.5 | (54.4, 58.4) |
| Larger than average | 33.8 | (31.3, 36.4) |  | 26.8 | (23.9, 29.9) |  | 30.5 | (28.7, 32.4) |
| Morbidity |  |  |  |  |  |  |  |  |
| No symptoms | 56.9 | (54.2, 59.6) |  | 67.3 | (64.2, 70.3) |  | 51.7 | (49.7, 53.7) |
| At least one symptom | 43.1 | (40.4, 45.8) |  | 32.7 | (29.7, 35.8) |  | 48.3 | (46.3, 50.3) |
| **Maternal** |  |  |  |  |  |  |  |  |
| Age (years) |  |  |  |  |  |  |  |  |
| 15-24 | 34.9 | (32.4, 37.5) |  | 25.2 | (22.4, 28.2) |  | 28.1 | (26.4, 29.9) |
| 25-34 | 53.0 | (50.3, 55.7) |  | 51.8 | (48.6, 55.1) |  | 52.2 | (50.3, 54.2) |
| 35-49 | 12.1 | (10.4, 14.0) |  | 23.0 | (20.4, 25.8) |  | 19.6 | (18.1, 21.3) |
| Highest educational level |  |  |  |  |  |  |  |  |
| No education | 12.6 | (10.9, 14.5) |  | 15.1 | (12.9, 17.6) |  | 1.8 | (1.5, 2.3) |
| Primary | 51.2 | (48.5, 53.9) |  | 44.7 | (41.5, 48.0) |  | 30.0 | (28.1, 31.8) |
| Secondary/higher | 36.2 | (33.7, 38.8) |  | 40.2 | (37.0, 43.4) |  | 68.2 | (66.3, 70.1) |

Table 2 (contd.) **Unadjusted percentages and 95% CIs showing the sample characteristics**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Characteristics** | **Cambodia (*n*=2,127)** | |  | **Myanmar (*n*=1,339)** | |  | **Indonesia (*n*=5,193)** | |
| **%** | **95% CI** |  | **%** | **95% CI** |  | **%** | **95% CI** |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |  |
| Marital status |  |  |  |  |  |  |  |  |
| Married/cohabiting | 96.0 | (94.9, 96.9) |  | 96.7 | (95.3, 97.7) |  | 97.8 | (97.1, 98.3) |
| Widowed/divorced/separated | 4.0 | (3.1, 5.1) |  | 3.3 | (2.3, 4.7) |  | 2.2 | (1.7, 2.9) |
| Active labour force participation |  |  |  |  |  |  |  |  |
| Not working (past 12 months) | 30.4 | (27.9, 33.0) |  | 41.3 | (38.1, 44.6) |  | 54.2 | (52.2, 56.2) |
| Low | 36.3 | (33.8, 38.9) |  | 29.4 | (26.5, 32.5) |  | 27.6 | (25.9, 29.3) |
| High | 33.3 | (30.8, 35.9) |  | 29.3 | (26.4, 32.4) |  | 18.2 | (16.7, 19.9) |
| Exposure to mass media |  |  |  |  |  |  |  |  |
| Frequent | 39.1 | (36.5, 41.8) |  | 34.7 | (31.6, 37.9) |  | 36.0 | (34.1, 37.9) |
| Moderate | 32.0 | (29.5, 34.6) |  | 37.8 | (34.6, 41.0) |  | 31.4 | (30.0, 33.3) |
| Limited | 28.9 | (26.6, 31.4) |  | 27.6 | (24.8, 30.6) |  | 32.7 | (30.8, 34.5) |
| Antental clinic (ANC) visits |  |  |  |  |  |  |  |  |
| 0-1 | 6.4 | (5.2, 7.8) |  | 14.2 | (12.1, 16.7) |  | 3.9 | (3.3, 4.5) |
| 2-4 | 32.1 | (29.7, 34.7) |  | 38.0 | (34.8, 41.2) |  | 12.5 | (11.3, 13.7) |
| 5+ | 61.5 | (58.9, 64.1) |  | 47.8 | (44.5, 51.1) |  | 83.7 | (82.4, 84.9) |
| **Paternal** |  |  |  |  |  |  |  |  |
| Highest educational level |  |  |  |  |  |  |  |  |
| No education | 8.8 | (7.4, 10.4) |  | 16.1 | (13.9, 18.7) |  | 1.0 | (0.8, 1.3) |
| Primary | 44.0 | (41.3, 46.7) |  | 39.5 | (36.3, 42.8) |  | 32.0 | (30.1, 33.9) |
| Secondary / higher | 47.2 | (44.5, 49.9) |  | 44.4 | (41.1, 47.7) |  | 67.0 | (65.1, 68.9) |
| Occupation |  |  |  |  |  |  |  |  |
| Not-working | 0.3 | (0.0, 0.9) |  | 0.0 | (0.0, 0.0) |  | 1.4 | (1.1, 1.9) |
| Agricultural | 47.1 | (44.5, 49.8) |  | 24.8 | (22.1, 27.7) |  | 21.4 | (19.9, 22.9) |
| Non-agricultural | 52.6 | (49.9, 55.3) |  | 75.2 | (72.3, 77.9) |  | 77.2 | (75.6, 78.7) |

Table 2 (contd.) **Unadjusted percentages and 95% CIs showing the sample characteristics**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Characteristics** | **Cambodia (*n*=2,127)** | |  | **Myanmar (*n*=1,339)** | |  | **Indonesia (*n*=5,193)** | |
| **%** | **95% CI** |  | **%** | **95% CI** |  | **%** | **95% CI** |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Household** |  |  |  |  |  |  |  |  |
| Household wealth |  |  |  |  |  |  |  |  |
| Poorest | 23.8 | (21.7, 26.2) |  | 26.6 | (23.9, 29.6) |  | 16.3 | (15.0, 17.7) |
| Poorer | 18.2 | (16.3, 20.2) |  | 22.9 | (20.3, 25.8) |  | 20.8 | (19.3, 22.5) |
| Middle | 19.7 | (17.6, 22.0) |  | 20.1 | (17.6, 22.9) |  | 20.7 | (19.1, 22.4) |
| Richer | 18.2 | (16.1, 20.5) |  | 5.5 | (13.3, 18.0) |  | 22.4 | (20.8, 24.2) |
| Richest | 20.1 | (17.9, 22.4) |  | 14.9 | (12.7, 17.4) |  | 19.7 | (18.2, 21.4) |
| Sex of HH head |  |  |  |  |  |  |  |  |
| Male | 77.5 | (75.2, 79.7) |  | 85.9 | (83.5, 88.0) |  | 91.4 | (90.2, 92.5) |
| Female | 22.5 | (20.4, 24.8) |  | 14.1 | (12.0, 16.5) |  | 8.6 | (7.5, 9.9) |
| **Spatial** |  |  |  |  |  |  |  |  |
| Residence |  |  |  |  |  |  |  |  |
| Rural | 86.0 | (84.3, 87.5) |  | 74.6 | (71.6, 77.5) |  | 50.8 | (48.8, 52.8) |
| Urban | 14.0 | (12.5, 15.7) |  | 25.4 | (22.6, 28.4) |  | 49.2 | (47.2, 51.2) |
| Geographical region |  |  |  |  |  |  |  |  |
| Region 1 | 8.7 | (7.3, 10.3) |  | 12.8 | (10.9, 15.0) |  | 23.4 | (22.1, 24.8) |
| Region 2 | 35.9 | (33.2, 38.7) |  | 15.5 | (13.1, 18.3) |  | 53.4 | (51.5, 55.3) |
| Region 3 | 31.5 | (29.0, 34.0) |  | 9.8 | (8.6, 11.2) |  | 5.7 | (5.2, 6.3) |
| Region 4 | 6.0 | (5.1, 7.0) |  | 8.3 | (7.0, 9.8) |  | 6.6 | (6.1, 7.2) |
| Region 5 | 18.0 | (16.3, 19.8) |  | 34.1 | (30.9, 37.5) |  | 7.9 | (7.3, 8.5) |
| Region 6 |  |  |  | 19.5 | (17.0, 22.2) |  | 1.2 | (1.1, 1.4) |
| Region 7 |  |  |  |  |  |  | 1.8 | (1.5, 2.1) |

CI: Confidence Interval.

Table 3 **Adjusted odds ratios (95% CI) of factors associated with meeting minimum dietary diversity**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Cambodia *(n=2096)*** | | |  | **Myanmar (*n=1336)*** | | |  | **Indonesia *(n=5160)*** | | |
| **Characteristics** | **AOR** | **95% CI** | ***P*** |  | **AOR** | **95% CI** | ***P*** |  | **AOR** | **95% CI** | ***P*** |
| **Socioeconomic** |  |  |  |  |  |  |  |  |  |  |  |
| Maternal educational level |  |  |  |  |  |  |  |  |  |  |  |
| No education/primary | 1.00 |  |  |  | 1.00 |  |  |  | 1.00 |  |  |
| Secondary/higher | 1.13 | (0.90, 1.42) | 0.277 |  | 1.39 | (1.00, 1.94) | 0.050 |  | 1.37 | (1.18, 1.59) | 0.000 |
| Maternal active labour force participation |  |  |  |  |  |  |  |  |  |  |  |
| Not working (past 12 months) | 1.00 |  |  |  | 1.00 |  |  |  | 1.00 |  |  |
| Low | 1.00 | (0.78, 1.29) | 0.999 |  | 1.11 | (0.78, 1.59) | 0.550 |  | 1.08 | (0.93, 1.24) | 0.324 |
| High | 1.10 | (0.85, 1.41) | 0.475 |  | 1.17 | (0.82, 1.66) | 0.382 |  | 1.28 | (1.06, 1.53) | 0.009 |
| Household wealth |  |  |  |  |  |  |  |  |  |  |  |
| Poorest | 1.00 |  |  |  | 1.00 |  |  |  | 1.00 |  |  |
| Poorer | 1.26 | (0.96, 1.66) | 0.100 |  | 0.99 | (0.64, 1.53) | 0.970 |  | 1.27 | (1.05, 1.54) | 0.014 |
| Middle | 1.73 | (1.28, 2.35) | 0.000 |  | 1.24 | (0.80, 1.93) | 0.334 |  | 1.53 | (1.25, 1.87) | 0.000 |
| Richer | 1.16 | (0.83, 1.62) | 0.377 |  | 0.53 | (0.96, 2.45) | 0.075 |  | 1.89 | (1.53, 2.33) | 0.000 |
| Richest | 2.37 | (1.65, 3.39) | 0.000 |  | 1.81 | (1.10, 2.96) | 0.019 |  | 1.98 | (1.58, 2.47) | 0.000 |
| Residence |  |  |  |  |  |  |  |  |  |  |  |
| Rural | 1.00 |  |  |  | 1.00 |  |  |  | 1.00 |  |  |
| Urban | 1.43 | (1.10, 1.88) | 0.008 |  | 1.69 | (1.18, 2.42) | 0.004 |  | 1.66 | (1.45, 1.90) | 0.000 |
| Geographical region |  |  |  |  |  |  |  |  |  |  |  |
| Region 1 | 1.00 |  |  |  | 1.00 |  |  |  | 1.00 |  |  |
| Region 2 | 0.31 | (0.18, 0.53) | 0.000 |  | 1.24 | (0.74, 2.09) | 0.415 |  | 0.97 | (0.81, 1.16) | 0.728 |
| Region 3 | 0.38 | (0.22, 0.65) | 0.000 |  | 0.72 | (0.43, 1.21) | 0.220 |  | 0.63 | (0.49, 0.80) | 0.000 |
| Region 4 | 0.33 | (0.18, 0.60) | 0.000 |  | 0.65 | (0.37, 1.14) | 0.131 |  | 0.83 | (0.67, 1.03) | 0.092 |
| Region 5 | 0.28 | (0.16, 0.48) | 0.000 |  | 0.81 | (0.49, 1.34) | 0.417 |  | 0.55 | (0.46, 0.67) | 0.000 |
| Region 6 |  |  |  |  | 2.26 | (1.38, 3.71) | <0.001 |  | 0.55 | (0.41, 0.73) | 0.000 |
| Region 7 |  |  |  |  |  |  |  |  | 0.56 | (0.41, 0.77) | 0.000 |

Table 3 (contd.) **Adjusted odds ratios (95% CI) of factors associated with meeting minimum dietary diversity**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Cambodia *(n=2096)*** | | |  | **Myanmar (*n=1336)*** | | |  | **Indonesia *(n=5160)*** | | |
| **Characteristics** | **AOR** | **95% CI** | ***P*** |  | **AOR** | **95% CI** | ***P*** |  | **AOR** | **95% CI** | ***P*** |

**Child**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Age (months) |  |  |  |  |  |  |  |  |  |  |  |
| 6-11 | 1.00 |  |  |  | 1.00 |  |  |  | 1.00 |  |  |
| 12-17 | 3.29 | (2.59, 4.18) | 0.000 |  | 3.28 | (2.22, 4.84) | 0.000 |  | 3.21 | (2.77, 3.72) | 0.000 |
| 18-23 | 3.38 | (2.60, 4.40) | 0.000 |  | 4.51 | (2.98, 6.84) | 0.000 |  | 4.74 | (4.05, 5.56) | 0.000 |
| Sex |  |  |  |  |  |  |  |  |  |  |  |
| Male | 1.00 |  |  |  | 1.00 |  |  |  | 1.00 |  |  |
| Female | 0.96 | (0.80, 1.16) | 0.698 |  | 0.70 | (0.52, 0.93) | 0.013 |  | 1.00 | (0.88, 1.13) | 0.999 |
| Breastfeeding status |  |  |  |  |  |  |  |  |  |  |  |
| Not currently breastfed | 1.00 |  |  |  | 1.00 |  |  |  | 1.00 |  |  |
| Currently breastfed | 0.73 | (0.58, 0.92) | 0.009 |  | 0.61 | (0.42, 0.89) | 0.010 |  | 0.49 | (0.42, 0.56) | 0.000 |
| Morbidity |  |  |  |  |  |  |  |  |  |  |  |
| No symptoms | 1.00 |  |  |  | 1.00 |  |  |  | 1.00 |  |  |
| At least one symptom | 0.83 | (0.69, 1.01) | 0.065 |  | 1.15 | (0.86, 1.54) | 0.355 |  | 1.25 | (1.10, 1.42) | 0.000 |
| Birth interval (months) |  |  |  |  |  |  |  |  |  |  |  |
| No previous birth | 1.00 |  |  |  | 1.00 |  |  |  | 1.00 |  |  |
| <24 | 0.60 | (0.40, 0.89) | 0.011 |  | 0.54 | (0.30, 1.00) | 0.048 |  | 0.94 | (0.72, 1.23) | 0.656 |
| ≥24 | 0.76 | (0.60, 0.97) | 0.025 |  | 0.70 | (0.49, 0.98) | 0.041 |  | 0.83 | (0.71, 0.98) | 0.032 |
| **Maternal** |  |  |  |  |  |  |  |  |  |  |  |
| Age (years) |  |  |  |  |  |  |  |  |  |  |  |
| 35-49 | 1.00 |  |  |  | 1.00 |  |  |  | 1.00 |  |  |
| 25-34 | 0.96 | (0.70, 1.30) | 0.773 |  | 0.57 | (0.40, 0.82) | 0.002 |  | 0.84 | (0.71, 1.00) | 0.044 |
| 15-24 | 0.69 | (0.48, 0.98) | 0.039 |  | 0.50 | (0.32, 0.80) | 0.003 |  | 0.73 | (0.58, 0.90) | 0.004 |
| Exposure to media |  |  |  |  |  |  |  |  |  |  |  |
| Frequent | 1.00 |  |  |  | 1.00 |  |  |  | 1.00 |  |  |
| Moderate | 0.70 | (0.56, 0.89) | 0.004 |  | 0.90 | (0.65, 1.26) | 0.544 |  | 1.47 | (1.26, 1.72) | 0.000 |
| Limited | 0.60 | (0.46, 0.79) | 0.000 |  | 0.74 | (0.49, 1.11) | 0.147 |  | 1.58 | (1.34, 1.85) | 0.000 |

AOR: Adjusted Odds Ratios; CI: Confidence Interval