JMCH Journal of Maternal and Child Health (2022), 07(04): 479-488
Masters Program in Public Health, Universitas Sebelas Maret

Systematic Review

Maternal Age Correlates with Stunting in Children: Systematics Review

Fardhiasih Dwi Astuti[1)], Arlina Azka[2)], Rokhmayanti Rokhmayanti[1)]

[1)]Faculty of Public Health, Ahmad Dahlan University, Yogyakarta
[2)]Masters Program in Public Health, Universitas Sebelas Maret

ABSTRACT

Background: Teenage mother should be ready for the consequences to come. It is important to get prepared both mentally and economically. A teenage mother and her offspring are at risk of malnutrition and stunting. This study aims to analyze the correlation between maternal age and the incidence of stunting based on published articles.
Subjects and Method: A systematic review was conducted to find the correlation between maternal age and the incidence of stunting. The research was conducted by seeking into the database by using PubMed, Ebsco, Google Scholar, and SpringerLink. The keywords used were "risk factor" OR "determinant" AND "stunting" AND "young maternal age" OR "adolescent mother*" OR "teen mother*" OR "adolescent pregnancy" OR "teen pregnancy" AND "logistic regression" OR "multivariate". The obtained articles underwent screening and conformity assessment. Articles that met the criteria were subsequently extracted.
Results: 1,048 articles were discovered from PubMed, Ebsco, Google Scholar and SpringerLink databases and 9 of them were included in the review. The articles were from Turkey, Tanzania, Pakistan, Ghana, Uganda, Burundi, 2 articles were from Ethiopia, and 1 article covered Brazil, Guatemala, India, Philippines, and South Africa. The prevalence of stunting in each region from the obtained articles showed a variation from 13.8% - 79.5%. It discovered the correlation between maternal age during pregnancy and incidence of stunting that pregnant women under the age of 20 were at greater risk for stunting compared to women aged ≥ 20 years (OR 1.37 – 7.56). Women at a younger age were at greater risk of having stunting children.
Conclusion: The correlation between maternal age during pregnancy and stunting indicates that the younger the mothers, the higher the risk for stunting. The risk for stunting will decrease with the increasing maternal age at the time of delivery.

Keywords: adolescence, stunting, teenage mothers, maternal age

Correspondence:
Fardhiasih Dwi Astuti. Jl. Prof. DR. Soepomo Sh, Warungboto, Umbulharjo, Yogyakarta, Special Region of Yogyakarta. Email: Fardhiasih.dwiastuti@ikm.uad.ac.id.

Cite this as:
Astuti FD, Azka A, Rokhmayanti R (2022). Maternal Age Correlates with Stunting in Children: Systematics review. 07(04): 479-488. https://doi.org/10.26911/thejmch.2022.07.04.11.

BACKGROUND

Stunting is a condition of chronic malnutrition that has an impact on growth disorders as indicated by a lower height than children of the same age. The nutritional problem that needs to be a concern for all parties is stunting. Regions with the malnutrition problems are mostly in Asia and Africa. 54% of stunting incidences are in Asia and 40% in Africa. The global incidence of stunting in 2000 – 2019 decreased from 32.4% to 21.3%(WHO, 2020) .

Stunting conditions acquires short-term and long-term impacts on individuals

and communities that may increase morbidity and mortality rate. Stunting can increase the risk for the incidence of infectious diseases, reduce intelligence and for long term it can increase the risk for non-communicable diseases (Soliman et al., 2021). Stunted children suffers from cognitive development reduction by 7% compared to those who are not stunted (Ekholuenetale et al., 2020). The condition of stunting in children is associated with impaired fat oxidation which is a risk factor for obesity. It generates obesity during adolescence and adulthood. The obesity will increase the risk for non-communicable diseases (Hoffman et al., 2000).

The incidence of stunting is associated with the first 1000 days of life. Many factors may contribute, including maternal knowledge, maternal height less than 150 cm, maternal body mass index (BMI) < 18.5 kg/m ^{2} , birth weight < 2.5 kg, the existence of two or more toddlers in one house, and diet diversity and repeated diarrheal episodes are also risk factors for stunting (Berhe et al., 2019). Maternal factors related to the incidence of stunting include maternal age. Mothers who marry, become pregnant and give birth at a young age may give impacts on the growth of children (Wells et al., 2022). A study conducted in 18 countries in Asia, Africa, and Latin America reveals that in 3 out of 7 countries in Asia and 6 out of 9 countries in Africa there is an effect of mothers who become pregnant and give birth at a young age toward height restriction of children aged 0-11 month. Moreover, in all countries observed, poorer growth continued after 24 months among children whose mothers are younger (Yu et al., 2016). A study shows that giving birth at the age of 20-30 years may reduce the risk for stunting in children by 81% compared to giving birth at the age of <20 years (aOR= 0.09; 95% CI= 0.03 to 0.29) (Akpinar and Teneler, 2022).

There have been a lot of studies conducted on mothers who give birth at a young age and its risk for stunting among children, however they do not discuss it comprehensively. This study will analyze the impact of giving birth at a young age on the incidence of stunting in children who are born based on literatures/ articles published in journals.

SUBJECTS AND METHOD

1. Study design

This study is a systematic review. The search for articles was carried out systematically and comprehensively by using several databases consisting of: PubMed, Ebsco, Google Scholar and SpringerLink. The search for the articles was not limited by the year of publication of July 2022. The keywords used in the article search included "risk factor" OR “determinant” AND “stunting” AND "young maternal age" OR "adolescent mother*" OR "teen mother*" OR "adolescent pregnancy" OR "teen pregnancy" AND "logistic regression" OR “multivariate”.

2. Population and sample

The study used PICO (Population-Intervention-Comparative-Outcomes) approach as a reference for the criteria for articles included in the systematic review. Population in this study was children. Intervention was gestational age in mothers <20 years. Comparative was gestational age ≥20 years. Outcomes was stunting events.

3. Inclusion criteria

Inclusion criteria for the articles included in the review were research articles that discussed the history of maternal age during pregnancy and the incidence of stunting in children, the study was primary research, used an analytical observational research design, were presented in English and Indonesian.

4. Exclusion criteria

Exclusion criteria were the study was not primary research, the article could not be accessed in full text version, and was not PICO-compliant.

5. Operational definition of variable

Stunting is a condition of chronic malnutrition which is indicated by lower height compared to the average stature of his/ her age, based on the Z score.

Maternal age during pregnancy is the age when a mother is pregnant with an offspring/ offsprings.

6. Instrument

The study used a cross sectional study design assessment checklist from CEBMa (center for evidence-based management) to assess the quality of articles to be included in the review.

7. Data Analysis

Data were analyzed by comparing the risk value of stunting in each region. The value of significant correlations were obtained from the value of confidence interval that did not exceed zero.

RESULTS

The search for articles obtained 1,048 articles from the PubMed, Ebsco, Google Scholer and SpringerLink databases. 193 duplications of titles were excluded. After conducted the screening process and the feasibility assessment according to the criteria, the study obtained 113 articles. The full text version of those articles were subsequently assessed. 9 articles were obtained to be included into the review. The process of search up to selecting to be included in the review is presented in Figure 1.

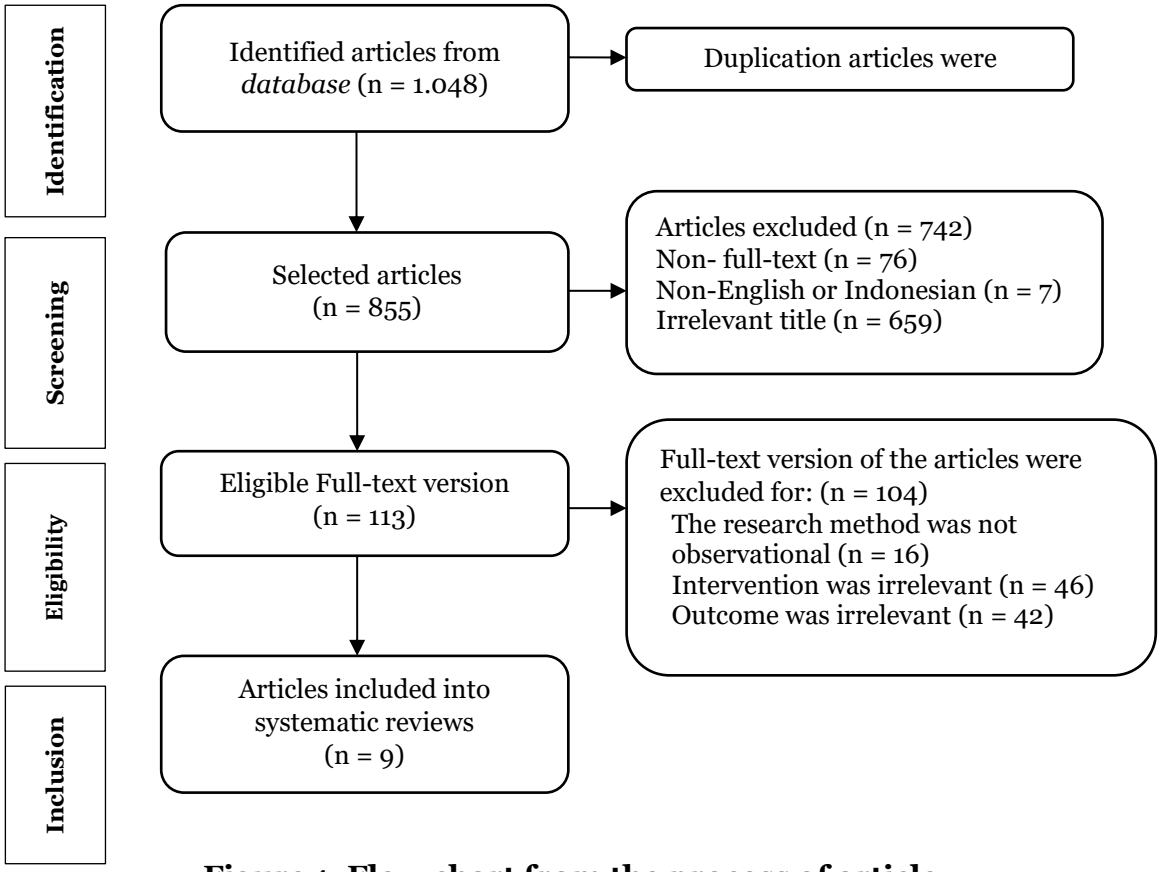

Figure 1. Flow chart from the process of article search up to being included in the review

The description of the articles included in the systematic review is presented in Table 1.

Table 1. Descriptions of articles that qualify for systematic reviews.

No	Author (Year)	Title	Country	Study Design	Effect Measures	Maternal Age	Child Age	Sample size	Data source
1	Akpinar and Teneler (2022)	Adolescent Motherhood and Negative Birth Outcomes, Stunting and Social Determinants: Secondary Analysis of Turkish National Data 2018	Turkey	Cross-sectional	aOR (adjusted odds ratio)	15-19; 20-49 (ref)	0-59 months	2102	Turkey Demographic and Health Survey (TDHS) 2018
2	Gonfa (2013)	Determinant Factors of Child Malnutrition in Ambo Town Oromia Region (The Case of Ambo Town)	Ethiopia	Cross-sectional	aOR	15-19 (ref); 20-24; 25-29; 30-34; 35-39; 40-44; 45-49	0-59 months	719	Households with children aged 0-59 months in Ambo Town
3	Degarege et al. (2015)	Undernutrition and associated risk factors among school age children in Addis Ababa, Ethiopia	Ethiopia	Cross-sectional	aOR	<20 (ref); 20-30; >30	5-14 years old	459	School-age children living in Woreda (district) 8, Lideta Sub-City
4	Fall et al. (2015)	Association between maternal age at childbirth and child and adult outcomes in the off spring: a prospective study in five low-income and middle-income countries (COHORTS collaboration)	Brazil, Guatemala, India, Philippines, and South Africa	Cohort	aOR	19; 20-24 (ref); 25-29; 30-34; 35	2 years	13199	Consortium for Health Oriented Research in Transitioning Societies (COHORTS)
5	Mtongwa et al. (2021)	A comparative analysis of determinants of low birth weight and stunting among under five children of adolescent and non-adolescent mothers using 2015/16 Tanzania Demographic and Health Survey (TDHS)	Tanzania	Cross-sectional	aOR	15-19 (ref); 20+	<5 years	8852	Tanzania Demographic and Health Survey

No	Author (Year)	Title	Country	Study Design	Effect Measures	Maternal Age	Child Age	Sample size	Data source
6	Tariq et al. (2018)	Factors Associated with Undernutrition in Children under the Age of Two Years: Secondary Data Analysis Based on the Pakistan Demographic and Health Survey 2012–2013	Pakistani	Cross-sectional	aOR	13-17; 18-22; 23-27; ≥28	<2 years	984	Pakistan Demographic and Health Survey 2012-2013
7	Yiga (2016)	Child Growth and Determinant Factors A Case Study of Burundi	Burundi	Cross-sectional	aOR	15-24 (ref); 25-34; 35-49	6-24 months	6158	Health centers from all provinces in Burundi except Bujumba Mairie
8	Yang et al. (2018)	Trends and determinants of stunting among under-5s: evidence from the 1995, 2001, 2006 and 2011 Uganda Demographic and Health Surveys	Uganda	Cross-sectional	aOR	15-19; 20-30; 31-49 (ref)	<5 years	14747	Uganda Demographic and Health Surveys (UDHS) 1995, 2001, 2006 and 2011
9	Wemakor et al. (2018)	Young maternal age is a risk factor for child undernutrition in Tamale Metropolis, Ghana	Ghana	case-control	aOR	15-17; 18-19; ≥20	<5 years	Cases (n=150) Controls (n=150)	Reports of high prevalence of teenage childbearing in the Metropolis: Kakpayili, Bulpiela, Kalariga and Kunyevilla

Table 2. The result of extraction of articles included in a systematic review based on maternal age and stunting incidence

No	Author (Year)	Study Sample	Mother's Age	Number of Mothers	Stunting Incidence	Percentage (%)	OR	95% CI/ p
1	Akpinar and Teneler (2022)	2,102	15–19	138	12	8.70	0.77	0.36 to 1.64
			20–49 (Ref)	1964	104	5.20		
2	Gonfa (2013)	719	15-19 (Ref)	84	48	57.7		<0.001
			20-24	160	88	55.2	0.8926	
			25-29	144	77	53.5	0.7796	
			30-34	121	63	51.9	0.7189	
			35-39	76	36	47.60	0.629	
			40-44	64	29	45.30	0.4139	
			45-49	70	28	40.40	0.3114	
3	Degarege et al. (2015)	459	<20 (Ref)	78	19	24.30		
			20 - 30	321	50	15.50	0.09	0.03 to 0.29
			>30	60	21	35.00	0.24	0.04 to 1.40
4	Fall et al. (2015)	13199	≤19	13199	5296	40.12	1.37	1.20 to 1.56
			20-24 (Ref)				1.00	
			25 - 29				0.84	0.76 to 0.93
			30-34				0.93	0.83 to 1.04
			≥35				1.18	1.03 to 1.35
5	Mtongwa et al. (2021)	8852	15 -19 (Ref)	600	183	30.60	1.00	
			>20	8252	2820	34.20	0.97	0.73 to 1.29
6	Tariq et al. (2018)	984	13 - 17	161	10	6.20	3.42	1.61 to 7.20
			18 - 22	500	73	14.60	2.30	1.13 to 4.60
			23 - 27	257	16	6.40	1.90	0.90 to 3.80
			28(Ref)	66	1	1.00	1.00	
7	Yiga (2016)	6158	15 -24	1925	1000	52.00	0.97	0.84 to 1.13
			25 – 34 (Ref)	3033	1577	52.00	1.00	
			35 - 49	1200	672	56.00	1.17	0.98 to 1.39
8	Yang et al. (2018)	14747	15 - 19	1053	446	42.35	1.57	1.31 to 1.87
			20 -30	8923	3777	42.32	1.18	1.08 to 1.29
			31 – 49 (Ref)	4771	1928	40.41	1.00	
9	Wemakor et al. (2018)	300	15 - 17	43			9.97	4.20 to 23.65
			18 - 19	107			7.08	3.85 to 13.00
			all 15- 19	150	89	59.30	7.56	4.20 to 13.63
			20 (Ref)	150	25	16.70	1	

For the assessment of the articles included in the review, the study used the reference for article quality assessment from CEBMa with observational study design. Quality assessment was conducted with 12 points of questions. One point was given for each question met and zero was given for each unmet question. The results of the assessment obtained values that ranged from 9-12 that met the quality.

The study obtained articles discussing maternal age during pregnancy and the incidence of stunting, namely 9 articles from Turkey, 2 articles from Ethiopia, Tanzania,

Pakistan, Ghana, Uganda, Burundi and 1 article covering Brazil, Guatemala, India, Philippines, and South Africa. The results of the review of the article discovered the prevalence of stunting in Brazil was 667 (13.8%), Guatemala 858 (79.5%), India 1841 (49.8%), Philippines 1558 (62.2%), and South Africa 372 (20.6%) (Fall et al., 2015).

The prevalence of stunting in Uganda based on demographic survey data from 1995, 2001, 2006 and 2011 respectively was 44.8%, 44.2%, 37.1% and 33.2%,.(Yang et al., 2018). In Ambo Town area, Oromia region, Ethiopia, the prevalence of stunting in children under five was 51.3%. Stunting issue turned out to be the highest compared to wasting and underweight cases (Gonfa, 2013). In Lideta sub-city, Addis Ababa, Ethiopia, it was discovered that 19.6% of stunting occurred in children (Degarege et al., 2015) .

The prevalence of stunting in children from a study in Turkey was 5.5%(Akpinar & Teneler, 2022). The incidence of stunting in adolescent mothers compared to non-adolescent mothers in Tanzania was 30.6% and 34.2%. (Mtongwa et al., 2021). In Burundi the prevalence of stunting in children was 53% (Yiga, 2021).

Based on Table 2, it is revealed that pregnant women aged <20 were at a greater risk for stunting than mothers aged ≥ 20 years (OR= 1.37 to 7.56). Women of younger age were at a greater risk (maternal age 15-17 years OR= 9.97 and 18 – 19 years OR= 7.56) (Wemakor et al., 2018) , (Age 13 – 17 years OR= 3.42 and 18 – 22 years OR= 2.3) (Tariq et al., 2018). Age 13-17 were at a greater risk for stunting.

There are 2 articles about women aged 20 - 34 with an odds ratio of 0.09 to 0.93 and was statistically significant (Degarege et al., 2015) ,(Fall et al., 2015). However, after the age of 35, the odds of stunting increased in OR= 1.18 (Fall et al., 2015), OR= 1.17 (Yang et al., 2018). Furthermore, there was an article which revealed that the older the mother, the lower the risk of stunting. The incidence of stunting decreased by 70% in mothers aged 45-49 years compared to mothers aged 15-19 years (Gonfa, 2013)

DISCUSSION

Based on the articles reviewed the highest prevalence of stunting was discovered in Guatemala region. Results of several other surveys indicates the prevalence of the area are 68.5% in 1995 and 64.5% in 2014 (Gatica-Domínguez et al., 2019). This figure that is not much different from the result of other studies. While the two regions in Ethiopia, based on the articles obtained, indicated much different prevalences. It is possibly due to differences in economic levels or rural and urban areas resulting in differences in stunting prevalence (Degarege et al., 2015). Moreover, areas with a high prevalence are areas with food insecurity (Gatica-Domínguez et al., 2019).

The trend of stunting cases has decreased from year to year. The review indicated a declining trend of stunting in Uganda region. Based on WHO data, the incidence of stunting has decreased, however better efforts are still needed to achieve the target in 2030. The global prevalence of stunting in 2020 is 22.0%. Regions with the most cases are Asia and Africa (UNICEF/ WHO/ WORLD BANK, 2021) .

This study indicated that adolescent mothers aged < 20 years were at a higher risk for the incidence of stunting than mothers aged over 20 years. Moreover, the increased risk for stunting will be greater in younger mothers. Age 13 – 17 had odds of 3.42 to 9.97. Similar results are revealed by other studies that use demographic and health survey data from 61 countries. The risk of stunting increases by 50% from the

maternal age of 13 years and will decrease gradually by 20% until maternal age is 27 years (Danaei et al., 2016) (Finlay et al., 2011). The increased risk for stunting would occur again at the maternal age of 35 years in accordance with the results of the review with OR = 1.18(Fall et al., 2015) , OR=1.17 (Yang et al., 2018) . This trend also occurs in the study conducted in 55 countries (Finlay et al., 2011).

Children who were born to young mothers have the potential for poor health conditions. In addition, the possibility of other diseases is greater than in older mothers. Anemia, underweight, diarrhea, infant mortality, and wasting are conditions that may occur in children born to young mothers (Finlay et al., 2011). The incidence of stunting is not only affected by maternal age at the time of delivery, but also a lot of other factors such as knowledge, social and economic factors (Akpinar and Teneler, 2022). The results of other studies indicate that young mothers have low economic conditions or come from poor families, and lack of knowledge due to dropping out of school. Children with early menarche have a relatively long adolescence period, the absence of parental guidance will lead them to promiscuity that evokes unwanted pregnancies.(Branson et al., 2015) .

In addition, pregnancy during adolescence requires more energy and nutrients both for mother and the offspring. Adolescence is the period of psychological, sexual, neurological, and behavioral development that requires more energy and nutrients. Pregnancy during adolescence leads to a struggle for nutrition between the mother and the fetus she is carrying. It generates nutritional deficiency condition that results in low birth weight or other conditions that is potentially impactful in the future (Nguyen et al., 2021). The results of the cohort study indicates that children born to adolescent mothers are shorter than children born to adult mothers. After one year period the incidence of stunting in adolescent mothers is 8% and adult mothers is 7% (Le Roux et al., 2019).

Factors that influence the incidence of stunting in adolescent mothers are greater because the economic level of adolescent mothers tends to be lower than that of adult mothers. In addition, exclusive breastfeeding can be a protective factor toward stunting. In adolescent mothers, exclusive breastfeeding is lower than in adult mothers (Le Roux et al., 2019).

AUTHOR CONTRIBUTION

FDA as a researcher contributed in drafting, reviewing articles and writing manuscripts. AA contributed in article search, article assessment and data extraction. RR contributed in reviewing and editing the manuscript.

FUNDING AND SPONSORSHIP

This research was funded by the researchers themselves.

CONFLICT OF INTERESTS

There is no conflict of interest in this study.

ACKNOWLEDGMENT

The researcher would like to thank the PubMed, Ebsco, Google Scholar and SpringerLink databases for providing articles for this research.

REFERENCES

Akpinar CV, Teneler AA (2022). Adolescent motherhood and negative birth outcomes, stunting and social determinants: secondary analysis of turkish national data 2018. 1–13. http://dx.doi.org/10.21203/rs.3.rs-1410546/v1

Berhe K, Seid O, Gebremariam Y, Berhe A, Etsay N (2019). Risk factors of stun-

ting (chronic undernutrition) of children aged 6 to 24 months in Mekelle City, Tigray Region, North Ethiopia: An unmatched case-control study. PLoS ONE, 14(6), 1–11. https://doi.org/10.1371/journal.pone.0217736

Branson N, Ardington C, Leibbrandt M (2015). Health outcomes for children born to teen mothers in Cape Town, South Africa. Economic Development and Cultural Change, 63(3), 589–616. https://doi.org/10.1086/679737

Danaei G, Andrews KG, Sudfeld CR, Fink G, McCoy DC, Peet E, Sania A, et al. (2016). Risk factors for childhood stunting in 137 developing countries: a comparative risk assessment analysis at global, regional, and country levels. In PLoS Medicine. 13(11). https://doi.org/10.1371/journal.pmed.1002164

Degarege D, Degarege A, Animut A (2015). Undernutrition and associated risk factors among school age children in Addis Ababa, Ethiopia Global health. BMC Public Health, 15(1), 1–9. https://doi.org/10.1186/s12889-015-1714-5

Ekholuenetale M, Barrow A, Ekholuenetale CE, Tudeme G (2020). Impact of stunting on early childhood cognitive development in Benin: evidence from Demographic and Health Survey. Gaz Egypt Pediatr Assoc. 68(1). https://doi.org/10.1186/s43054-020-00043-x

Fall CHD, Sachdev HS, Osmond C, Restrepo-Mendez MC, Victora C, Martorell R, Stein AD, et al. (2015). Association between maternal age at childbirth and child and adult outcomes in the offspring: A prospective study in five low-income and middle-income countries (COHORTS collaboration). The Lancet Global Health, 3(7), e366–e377. https://doi.org/10.1016/S2214-109X(15)00038-8

Finlay JE, Özaltin E, Canning D (2011). The association of maternal age with infant mortality, child anthropometric failure, diarrhoea and anaemia for first births: Evidence from 55 low- and middle-income countries. BMJ Open, 1(2). https://doi.org/10.1136/bmjopen-2011-000226

Gatica-Domínguez G, Victora C, Barros AJD (2019). Ethnic inequalities and trends in stunting prevalence among Guatemalan children: an analysis using national health surveys 1995-2014. Int J Equity Health, 18(1), 110. https://doi.org/10.1186/s12939-019-1016-0

Gonfa AA (2013). Determinat factors of child malnuration in ambo town oromia region (the case of ambo town). 1(10-9100773). Indhria Ganhd National Open University.

Hoffman DJ, Sawaya AL, Verreschi I, Tucker KL, Roberts SB (2000). Why are nutritionally stunted children at increased risk of obesity? Studies of metabolic rate and fat oxidation in shantytown children from Sao Paulo, Brazil. Am J Clin Nutr, 72(3), 702–707. https://doi.org/10.1093/ajcn/72.3.702

Le Roux K, Christodoulou J, Stansert-Katzen L, Dippenaar E, Laurenzi C, Le Roux IM, Tomlinson M, Rotheram-Borus MJ (2019). A longitudinal cohort study of rural adolescent vs adult South African mothers and their children from birth to 24 months. BMC Pregnancy Childbirth, 19(1), 1–8. https://doi.org/10.1186/s12884-018-2164-8

Mtongwa RH, Festo C, Elisaria E (2021). A comparative analysis of determinants of low birth weight and stunting among under five children of adolescent and non-adolescent mothers using 2015/16 Tanzania Demographic and

Health Survey (TDHS). BMC Nutr, 7(1), 1–10. https://doi.org/10.1186/s-40795-021-00468-6

Nguyen PH, Scott S, Khuong LQ, Pramanik P, Ahmed A, Rashid SF, Afsana K, Menon P (2021). Adolescent birth and child undernutrition: an analysis of demographic and health surveys in Bangladesh, 1996–2017. Ann. N. Y. Acad. Sci, 1500(1), 69–81. https://-doi.org/10.1111/nyas.14608

Soliman A, De Sanctis V, Alaaraj N, Ahmed, S, Alyafei F, Hamed N, Soliman N (2021). Early and long-term consequences of nutritional stunting: From childhood to adulthood. Acta Biomed, 92(1), 1–12. https://doi.org/10.2375-0/abm.v92i1.11346

Tariq J, Sajjad A, Zakar R, Zakar MZ, Fischer F (2018). Factors associated with undernutrition in children under the age of two years: Secondary data analysis based on the Pakistan demographic and health survey 2012–2013. Nutrients, 10(6), 1–20. https://doi.-org/10.3390/nu10060676

UNICEF/ WHO/ WORLD BANK (2021). Levels and trends in child malnutrition UNICEF/ WHO/ World Bank Group Joint Child Malnutrition Estimates Key findings of the 2021 edition. World Health Organization, 1–32. https://-www.who.int/publications/i/item/978 9240025257

Wells JCK, Marphatia AA, Cortina-Borja M, Manandhar DS, Reid AM, Saville NM (2022). Associations of maternal age at marriage and pregnancy with infant undernutrition: Evidence from first-time mothers in rural lowland Nepal. Am J Phys Anthropol, January, 557–573. https://doi.org/10.1002/ajpa.24-560

Wemakor A, Garti H, Azongo T, Garti H, Atosona A (2018). Young maternal age is a risk factor for child undernutrition in Tamale Metropolis, Ghana. BMC Res. Notes, 11(1), 1–5. https://doi.org-/10.1186/s13104-018-3980-7

World Health Organization (2020). Levels and trends in child malnutrition: Key findings of the 2020 Edition of the Joint Child Malnutrition Estimates. Geneva: WHO, 24(2), 1–16.

Yang YY, Kaddu G, Ngendahimana D, Barkoukis H, Freedman D, Lubaale YAM, Mupere E, Bakaki PM (2018). Trends and determinants of stunting among under-5s: Evidence from the 1995, 2001, 2006 and 2011 Uganda Demographic and Health Surveys. Public Health Nutr, 21(16), 2915–2928. https://doi.org/10.1017/S1368-980018001982

Yiga P (2021). Child growth and determinant factors a case study of burundi (Issue June 2016). Universiteit Gent.

Yu SH, Mason J, Crum J, Cappa C, Hotchkiss DR (2016). Differential effects of young maternal age on child growth. Glob Health Act, 9(1), 1–13. https://-doi.org/10.3402/gha.v9.31171