

Routine Cleaning of Poultry Cages as a Determinant of Underweight among Children Aged 6-59 Months in Indonesia

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Abstract

Objective: This study examined whether there is a significant relationship between routine cleaning of poultry cages and the incidence of underweight in children aged 6-59 months in Indonesia. Raising poultry has a significant relationship with the incidence of recurrent infections. Families who keep poultry have greater incidence of fevers and colds. This is a concern when the management of the poultry cage is poor, as the presence of poultry in the environment is one of the causes of recurrent infectious diseases with symptoms of cold or fever, and has a significant relationship with underweight.

Method: This cross sectional study in Babakan Madang Subdistrict with participants of 612 mother and children under five, and 298 of them have poultry. Interviewing respondents using questionnaire and poultry management observations. Anthropometric measurements in children under five are weight and height. *Descriptive* analysis and the relationship of independent variables with the incidence of underweight using *chi-square* for bivariate analysis.

Results: 10.8% of children aged 6-59 months were underweight. Significant relationships were found between underweight status and routine cage cleaning ($p = 0.017$; OR 3.205; 90%CI:1,268-8,101); family income ($p = 0.050$; OR 1,728; 90% CI:1,033-2,892); recurrent fever ($p = 0.046$; OR 1,763; 90% CI:1,042-2981); and recurrent colds ($p = 0.003$; OR 2,259; 90%CI: 1,348-3,784).

Conclusion: Routine cleaning of poultry cages at least once per day is the key to maintaining environmental cleanliness so that the poultry that are kept do not cause infectious diseases that lead to underweight among children.

Keywords: *underweight, children, poultry, infectious disease.*

Introduction

Environmental factors such as access to clean water, sanitation and hygiene, including maintaining poultry, especially chickens that live freely and roam the environment where children live, play an important role. Several previous studies have shown that sex, diarrhea, acute respiratory infections, growth monitoring, completeness of immunization, management of cages and raising poultry are all related to the nutritional status of children, and specifically to whether they are underweight [1,2,3,4,5].

Based on health data in Bogor Regency (2015), 16,291 cases of diarrhea and gastroenteritis in children 6-59 month (10.8%), 12,086 cases of skin disease

and sub-cutaneous skin issues in children 6-59 month (7.54%), and high prevalence of ARI in children 6-59 month, at 79,004 cases (49.29%) [6]. Some of these cases are thought to be due to sources of environmental pollution through air and water that results from the unsafe disposal of household waste, accumulation of livestock manure, and residents' hygiene, as well as poor environmental sanitation of residents' homes [7].

Infectious diseases that often affect children under five include flu, scabies, which can cause itchy rashes, fever, diarrhea, and toxoplasma, which can inhibit fetal growth [8].

Materials and Method

1. Participants

This research was a team-based study with a cross-sectional observational design. Research locations encompassed a working area of six selected villages (Kadumanggu, Babakan Madang, Cipambuan, Sumur Batu, Cijayanti, and Karang Tengah) in Babakan Madang Subdistrict with a sample of 612 mother and children under five and 298 of them have poultry cages. Babakan Madang subdistrict is part of the Bogor Regency in the province of West Java, Indonesia. Consecutive recruitment of mother and Children inclusion criteria of the sample were: mother and children aged 6-59 months who lived and settled for at least one year in the study area.

While the exclusion criteria for toddlers are as follows: Toddlers who experience mental disorders, physical disabilities and congenital diseases (1); If there are two toddlers in one family, then the youngest toddler is used as a research sample (2); Twin babies in the family are not taken (3).

2. Data collection

The minimum sample size was calculated using the hypothesis test for two populations and obtained $N = 612$, and collecting the responden using purposive sampling with minimum 100 respondent in every villages. The dependent variable in this study was underweight as an indicator of nutritional status. The independent variables were family income, personal hygiene, environmental sanitation, and poultry maintenance management. Data collections was carried out by trained enumerators who divided into 2 teams lead by 1 field coordinator, and consist by 12 enumerators.

First step we collecting the anthropometry measurements were children's weight and height. Public health community service as a place to measure anthropometrics collected in one day, with data collection techniques taken from all respondents of mothers and children under five years who came. From one village consists of 3-4 community health service. Each community health service consists of 25-30 respondents. Second step in this study was conducted by interviewing respondents using the 2018 basic health research (Risksdas 2018) questionnaire. Information

was also collected regarding observations of the presence of poultry cages with reference to poultry rearing management in residential neighborhoods in 2006.

The independent variables were children's characteristics: age (1); body weight (2); and height (3). Family characteristics were defined through the level of family income. Sanitation was assessed in terms of how household waste was handled. The independent variables were personal hygiene, through the habit of mothers washing their hands with soap and running water (1) and cutting their nails at least once per week (2). The existence of poultry and its relation to environmental sanitation was assessed through: raising poultry (1); number of poultry owned (2); distance of the cage from the residents' house (3); distance of the cage from the source of drinking water (3); routine cleaning of cages (4); handling of dead poultry (5); handling of garbage and manure (6).

3. Measurement and statistical analysis,

Anthropometric measurements in children under five are weight and height. The weight of children aged 24-59 months using a digital scale using the "Tanita" brand with accuracy up to two digits behind the comma. Height measurements using microtoa with the GEA brand. Measuring the weight of toddlers aged 6-23 months using baby scales and digital height using the "onemed" with accuracy up to 2 digits behind the comma.

Results

(Z-scores) were calculated using *WHO-Anthro*; Z-score results were then grouped, with < -2.00 being classified as underweight and ≥ -1.999 as non-underweight. Observation of the distance of the cage with related variables (drink water resources and children household) was measured using the *GPS-Essentials* application and in meters, with distances of 0-3 meters being categorized as posing risks to the health and nutritional status of children under five and distances of > 3 meters as posing no risk. Statistical analysis used is IBM SPSS statistics 20 with a license from Public Health Faculty Universitas Indonesia, with *descriptive* analysis and the relationship of independent variables with the incidence of underweight using *chi-square* for bivariate analysis. Values were deemed to be

statistically significant when $p < 0.1$

Results

Univariate and bivariate analysis were carried out for each variable, both independent and dependent. The analysis obtained the following results in Descriptive statistics for age and children anthropometric measurement (Table 1) and The relationship of independent variables with the incidence of underweight (Table 2).

Participants were typically aged 16-48 years old for mother with average 29,32 (6,34) years, and children 6-59 month and the mean 29,32 (15,56) month. Mean children height 82,7cm (11,36); and children weight is 11,16 kg (2,98) (Table 1).

Independent variable by connecting the above variables to the incidence of underweight as the dependent variable. More than half of the participants (64,8%) had an income equal to or greater than the regional minimum wage of West Java Province (\geq IDR 3,760,000). Family income has a significant relationship with the incidence of underweight, with a p-value of 0.1 ($p=0.05$). The results of the chi-square analysis for the recurrent disease were as follows. Recurrent fever ($p = 0.046$); recurrent colds: ($p = 0.003$). The presence of poultry and its relation to environmental sanitation were also found to be significant, routine cleaning of cage ($p = 0.017$); household waste disposal ($p = 0.099$). The relationship between routine (weekly) nail cutting habits and the risk of underweight in children was also shown to be significant ($p = 0.067$) (Table 2).

Table 1. Descriptive statistics for age and children antropometric measurement.

Variabel	n	%	Mean (SD)	Min - Max
Age of mother	610	99.7	29.32 (6.34)	16-48
Age of Children	612	100	27.54 (15.56)	6-59
Children weight	612	100	11,16 (2.98)	4,80 – 25,10
Children height	612	100	82.7 (11.36)	50,30-115,0
Children weight according to height	612	100	-0,08 (0,065)	-4,83-6,69
Children weight according to age	612	100	-0,86 (0,06)	-5,07 – 3,81

Table 2. The relationship of independent variables with the incidence of underweight

Variable	Normal		Underweight		Total		P 90%CI	OR
	%	n	%	n	%	n		
BB/U (Z-score)	89.2	546	10.8	66	100	612		
Family income \geq Rp. 3.760.000,- < Rp. 3.760.000,-	91.1 85.6	359 543	8.9 14.4	35 66	100 100	394 215	0,05** (1.033-2.892)	1,728
Recurring fever Yes No	84.9 90.8	152 387	15.1 9.2	27 39	100 100	179 426	0.046** (1.042-2.981)	1.763

Cont... Table 2. The relationship of independent variables with the incidence of underweight

Variable	Normal		Underweight		Total		P 90%CI	OR
	%	n	%	n	%	n		
Recurring colds								
Yes	83.9	187	16.1	36	100	223	0.003** (1.348-3.784)	2.259
No	92.1	352	7.9	30	100	382		
Recurring coughs								
Yes	86.3	363	9.5	38	100	401	0.148 (0.93-2.557)	1.520
No	90.5	176	13.7	28	100	204		
Have poultry								
Yes	90.5	268	9.5	30	100	298	0.475 (0.742-2.121)	1.255
No	88.4	266	11.6	35	100	301		
The number of poultry owned								
1-20	88.4	130	11.6	17	100	147	0.512 (0.337-1.542)	0.720
>20	91.4	138	8.6	13	100	151		
Distance from the cage to the house								
>3 meter	94.1	20	5.9	1	100	17	1 (0.231-14.14)	1.806
0-3 meter	89.9	248	10.1	33	100	281		
Distance from the cage to drinking water source								
>3 meter	92.1	105	7.9	9	100	114	0.391 (0.684-3.517)	1.551
0-3 meter	88.3	158	11.7	21	100	179		
Routine cleaning of poultry cage								
Good (1x/day)	95.1	117	4.9	6	100	123	0.017** (1.268-8.101)	3.205
Poor	85.9	146	14.1	24	100	170		
Handling of dead poultry								
Good (burned or buried)	89.6	250	10.4	29	100	279	1 (0.861-0.933)	0.896
Poor (dumped into the river / trash)	100	1	0	0	100	1		
Handling of garbage and manure								
Good (separate from household)	89.4	186	10.6	22	100	208	0.673 (0.308-1.825)	0.749
Poor (combined with household)	91.9	79	8.1	7	100	86		
Household waste disposal								
Good	90.4	424	9.6	45	100	469	0.099** (0.953-2.901)	1.663
Poor	85.0	119	15.0	21	100	140		
Hand-washing habits								
Good	88.2	254	11.8	34	100	288	0.550 (0.496-1.379)	0.827
Poor	90.0	289	10.0	32	100	321		
Nail-cutting habits								
Good	91.6	315	8.4	29	100	344	0.067** (0.998-2.850)	1.686
Poor	86.6	219	13.4	34	100	253		

**Variable significant ($p < 0.1$)

Discussion

Routine cleaning of the cage at least once per day is the key to maintaining environmental cleanliness, have a protective effect against underweight, reducing the incidence by a factor of three. The poultry that are kept do not cause infectious diseases that lead children to become underweight. This is in line with several studies [8].

Another important factor is the poultry disposal and livestock manure separately from household waste and in closed containers. Most of the respondents in this study disposed of their enclosure waste and their household waste together in open rubbish sites. Household waste disposal was significantly associated with children being underweight. Previous research has demonstrated that [9].

It is known that recurrent fevers and colds are one of the determinants of underweight status in children (table 2). There is a relationship between the maintenance of poultry and pathogens in children, affecting the health and the nutritional status of children under five, leading them to become underweight. This is related to the routines of poultry owners in terms of whether they maintain the cleanliness of the cage with routine cleaning at least once per day, the distance of the cage from the house, and the distance of the cage from the household drink water source. This is also in line with previous research [10].

Environmental factors such as household drink water sources, sanitation and hygiene, with particular attention focused on roaming chickens, given the proximity to children in rural areas, were a concern in this study related to the nutritional status of children living in the environment. There is a risk that communicable diseases or environmental enteric dysfunction can occur due to exposure to livestock droppings, causing recurrent infections in children living in that environment [11,12,13,14,15].

Raising poultry has a significant relationship with the incidence of recurrent infections. Children who maintain poultry have increased incidence of recurrent fever and colds. This is a concern related to poor cage management, and the presence of poultry in the neighborhood is one of the causes of such recurrent infectious diseases and has a

significant relationship with underweight.

In line with prior research [2], this study showed that the habit of mother for cutting children's nails at least once per week was significantly associated with underweight in children. Pathogens from poultry are generally transmitted through poor environmental sanitation, polluted water sources, and hand and nail hygiene.

The description of the relationship of infectious diseases in children under five who have poultry at home compared to those who do not was also a concern in this study. From the results in Tables 1 and 2, It can be seen that households with routine cleaning a caged poultry a significant relationship with underweight. Most of those who maintain poultry are families with an income of less than 3.7 million rupiah/month. In line with these results [1,8,13]. It is necessary to provide understanding and increase knowledge in families who maintain poultry, to encourage them to set aside some of their poultry products to be consumed by the family, especially their children [16,17,18,2].

Conclusion

Routine cleaning of poultry cages at least once per day is the key to maintaining environmental cleanliness. So that the poultry that are kept do not cause infectious diseases that lead to underweight among children.

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Declarations

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