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# Cadmium Contamination in Farmland Soil and Water Near Zinc Mining Site

## Pencemaran Kadmium pada Air dan Tanah Pertanian Dekat Lokasi Pertambangan Zink

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**Abstract**

This study was a cross-sectional study conducted in Phatadpadaeng Subdistrict, Mae Sod District, Tak Province, Thailand. This study aimed to determine cadmium concentration in farmland soil and water as well as at the residence of farmers and households. As many as 48 samples of farmers' residence soil and water, twelve samples of households and six samples of farmland soil and eight samples of farmland water were investigated for cadmium concentration using Graphite Furnace Atomic Absorption Spectrophotometer. The Mann-Whitney U test was used for the analysis of the difference of cadmium concentration between farmland soil and residence soil, farmland water and residence water. The results showed no statistically difference among all matrixes, however, farmland soil and farmland water showed highest concentration compared to those of resident farmers and households. The cadmium concentrations in all samples were far below the limit values. This study clearly showed that working conditions of farmers demonstrated higher level of cadmium compared to the living conditions. The cause of this contamination might be from the activities of the surroundings industry. Therefore, it would be recommended that farmers should consider for cadmium exposure while working in farm.

**Keywords**: Cadmium concentration, farmland soil, farmland water

**Abstrak**

Penelitian ini merupakan penelitian potong lintang yang dilakukan di Kecamatan Phatadpaeng, Kota Mae Sod, Provinsi Tak, Thailand. Penelitian ini bertujuan untuk mengetahui konsentrasi kadmium pada air dan tanah pertanian serta pada pemukiman petani dan rumah tangga. Konsentrasi kadmium pada 48 sampel tanah dan air pemukiman petani, 12 sampel rumah tangga, enam sampel tanah pertanian, dan delapan sampel air pertanian ditelusuri menggunakan *Graphite Furnace Atomic Absorption Spectrophotometer*. Uji Mann-Whitney U digunakan untuk analisis perbedaan konsentrasi kadmium antara tanah pertanian dan tanah pemukiman, air pertanian dan air pemukiman. Hasil penelitian menunjukkan tidak terdapat perbedaan secara statistik pada seluruh matriks, namun air dan tanah pertanian menunjukkan konsentrasi tertinggi dibandingkan pemukiman petani dan rumah tangga. Konsentrasi kadmium pada seluruh sampel jauh di bawah nilai batas. Penelitian ini secara jelas memperlihatkan bahwa kondisi tempat bekerja menunjukkan level kadmium yang lebih tinggi dibandingkan kondisi tempat tinggal. Penyebab pencemaran ini dapat berasal dari aktivitas di sekitar industri. Oleh karena itu, petani sebaiknya mempertimbangkan pajanan kadmium saat bekerja.

**Kata kunci**: Konsentrasi kadmium, tanah pertanian, air pertanian

### Introduction

Cadmium is widely spread in the earth's crust.[1] This metal is usually found in zinc ore deposits and common a by-product of zinc mining. It is concerned as an environmental pollutant due to its toxics effect on biological system as well as on many organs and with a slow elimination rate. Its half life in human ranged between 10 – 30 years. The kidney is considered the critical target organ of chronic effect to cadmium.[2-4] The well-known situation occurred at the village along Jinzu River in Toyama, Japan. Due to Kamioka Mine as operated by a company, cadmium contamination was found in water causing Itai-Itai disease. The symptoms of sufferers were bone decay, renal destruction, back and waist pain, anorexia and

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weakness. Furthermore, it was reported that cadmium concentration around the river was at 4.85 mg/kg soil.[5-8]

Mae Sod District is located in Tak Province of the Northern Thailand where zinc mining capacity up to 214,023 metric tons takes place. Mining and milling operation together with grinding, concentrating ores and disposal of tailings, along with mine and mill waste water were performed here. The mining process may cause cadmium contamination to the environment, material transfer and removal of mine tailing.[9] The agriculture area received irrigation from two creeks (Mae Tao, Mae Ku) passing through a zinc mining.[2] The report of The International Water Management Institute (IWMI) showed the cadmium levels in soil coming from Ban Pae De at Mae Sod. The concentration was ranged from 3.4 to 284.0 mg/kg in 154 samples or 94 times higher than those of European Economic Community Maximum Permissible (MP) level in soil (3.0 mg/kg). In the later year, they expanded the sampling sites along Mae Tao creek in Mae Tao Subdistrict. The result was ranged from 0.46 – 218.00 mg/kg or about 72 times higher than level of European Economic Community Maximum Permissible (MP) in soil. [6,10-11] As mentioned above, this area had showed extremely high cadmium levels in the environment that could cause cadmium contamination in rice. This study needs to compare the concentration of farmland soil and water and its concentration at farmer's house which might lead to occupational approach. Therefore, this study focused on the cadmium concentration in soil and water in farmland and at the residence of farmers and households in Phrathatphadaeng Subdistrict, Mae Sod District, Tak Province, Thailand.

## Method

Phrathatphadaeng Subdistrict is located in Mae Sod District, Tak Province in the Northern Thailand, in the mountain area of the border between Thailand and Myanmar. The zinc mining is located in this area and has been affected by the impacts of cadmium. The sample sites were shown in Figure 1, Mae Tao Mai and Pae De Village are located in the downstream of zinc mining and contaminated areas.

Data sampling was collected during February 6$^{th}$ – 10$^{th}$, 2012. As many as 48 samples of farmers' residence soil and water, 12 samples of households, six samples of farmland soil and eight samples of farmland water. The samples were selected by systematic random sampling. GraphiteFurnace Atomic Absorption Spectrophotometer (GFAAS) model Varian SpectrAA Zeeman 220 was used to analyze cadmium concentration in soil and water.

Soil samples were collected following the Sampling Technique and Strategies and Minnesota Department of Agriculture.[12] Water samples were collected following USEPA Region 9 Laboratory Richmond California Field Sampling Guidance Document #1225 Surface Water Sampling.[13] Samples were prepared and analyzed by the

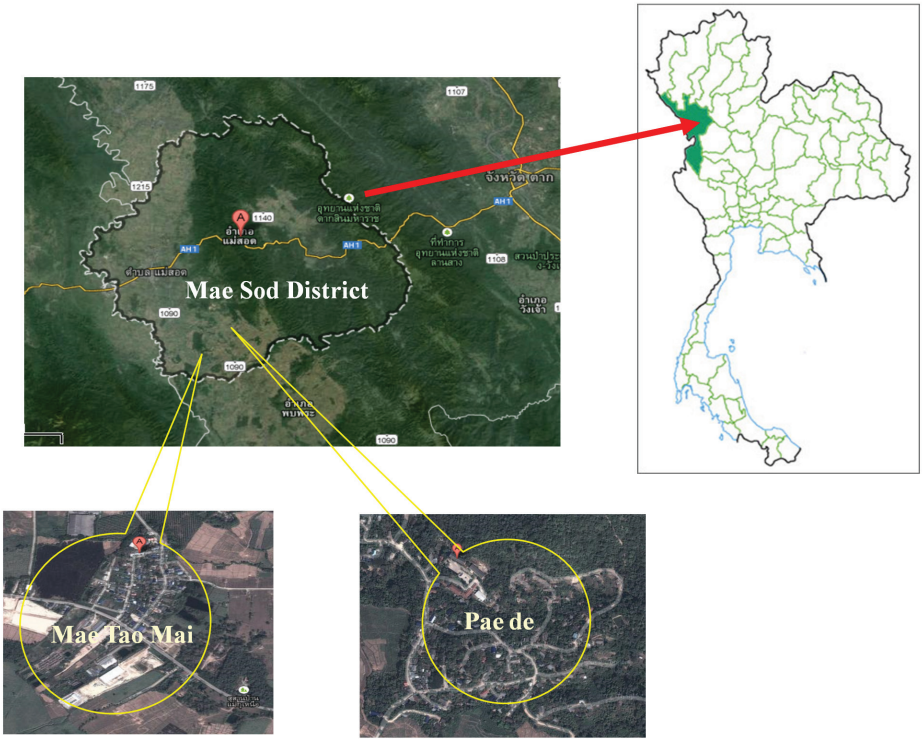


**Figure 1. The Overview of Study Area**

GFAAS model Varian SpectrAA Zeeman 220 following the Canadian Society of Soil Science Method with a modification by Center of Excellence on Environmental Health, Toxicology and Management of Chemicals (ETM).[14]

For soil preparation, first, 10 mL of nitric acid ($HNO_3$) was used for matrix digestion. Second, soil samples were dried, milled and filtered before extraction process. Third, the sample was weighed for 0.5 gram and added with $HNO_3$ for 10 mL into vessel, and assembled the vessels into microwave process for the digestion for 30 minutes. Fourth, after the heating at 210 ˚C and 190 psi then vessels were taken out after cooling down process to 50 – 60 ˚C. Fifth, came to filter step using filter paper. Next, adjust the volume to 50 mL by adding distilled water. All of samples were analyzed by GFAAS.

For water preparation, the first was the chemical reagent, 5 mL of $HNO_3$ was used for the matrix digestion. Second, the sample was added 45 mL into vessel and added $HNO_3$ 5 mL into vessel, and assembled the vessels into microwave step to digest for 30 minutes. Fourth, after the heating at 170 ˚C and 190 psi then vessels were taken out, further came to cooling down to 50 – 60 ˚C. The fifth step was filter using filter paper. Next, adjust the volume to 50 mL by adding distilled water. All of samples were analyzed by GFAAS.

For sample analysis, chemical reagents were 65% $HNO_3$ and hydrochloric acid (HCl). Next, standard solution was prepared from 100 ppb cadmium standard solution, then took 1 mL diluted with 100 mL deionized water and prepared 5 degree for calibration curve (0, 0.2, 0.4, 0.6, 0.8 and 1µg/l). The samples would be analyzed for cadmium concentration and it should be prepared prior to the analysis. The dilution factor was 10 : 0.1 mL of sample mixed with 0.9 mL of the deionized water.

The study protocols were approved by the "Ethics Committee for Human Research Faculty of Public health", Mahidol University, Bangkok with COA No. MUPH 2011-037.

This analysis was performed using SPSS software versions 18 for the descriptive and inferential data analysis. Descriptive statistics were used to describe the cadmium concentration in resident soil and water, farmland soil and water. The cadmium concentration in soil and water did not show in mean value because the value of the cadmium concentration did not show normal distributions. Then the median and interquartile range (IQR) were used to explain the cadmium concentration in soil and water. Inferential statistics was the Mann-Whitney U test for comparing the difference of cadmium concentration between farmland soil and resident soil as well as farmland water and resident water.

## Results

The results of cadmium contamination in living environment among farmers and households consisted of farmland soil, resident soil, farmland water and resident water were presented in Table 1 and Table 2. The values were all in the range of normal concentration.

## Discussion

Human can absorb cadmium into the body either by ingestion, inhalation and dermal exposure. Factors influencing cadmium absorption are the forms in which cadmium in the food, tobacco and the hygiene behavior.

**Table 1. Cadmium Concentration in Samples**

| Sample | Standard[a] | Cadmium Concentration | | | | p value |
|---|---|---|---|---|---|---|
| | | Mini-Max | Median | SD | IQR[b] | |
| **Farmers (n=48)** | | | | | | |
| Resident soil (mg/kg) | 37 mg/kg | 0.00002-0.69 | 0.018 | 0.142 | 0.078 | 0.225 |
| Farmland soil (mg/kg) | 37 mg/kg | 0.05-0.61 | 0.152 | 0.199 | 0.230 | |
| Resident water (mg/l) | 0.005 mg/l | 0.000006-0.0008 | 0.00015 | 0.00012 | 0.00013 | 0.345 |
| Farmland water (mg/l) | 0.005 mg/l | 0.0003-0.0005 | 0.00033 | 0.00007 | 0.00014 | |

[a]Soil from National Environment Board (NEB) 2004[15], Water from National Environment Board (NEB) 1994[16], [b]Interquartile Range

**Table 2. Comparison of Cadmium Concentration in Resident Soil and Resident Water among Households**

| Farmer-related Samples | Standard Value[a] | Cadmium concentration | | | |
|---|---|---|---|---|---|
| | | Min-Max | Median | SD | IQR[b] |
| Resident soil (mg/kg) | 37 mg/kg | 0.0004-0.38 | 0.021 | 0.106 | 0.086 |
| Resident water (mg/l) | 0.005 mg/l | 0.000006-0.0003 | 0.00014 | 0.00011 | 0.0002 |

[a]Soil from National Environment Board (NEB) 2004[15], Water from National Environment Board (NEB) 1994[16], [b]Interquartile Range

Acute effects by ingestion may lead to gastrointestinal disorders, such as nausea, vomiting, abdominal cramps and diarrhea. Acute effects by inhalation may lead to respiratory manifestations, such as severe bronchial and pulmonary irritation, subacute pneumonitis and lung emphysema. Chronic effects occur mainly on the kidneys, lungs and bones. The kidney is the target organ for the general population as well as for occupationally exposed populations. Cadmium is known to accumulate in the human kidney for a long time, from 20 to 30 years, also known to occur health effects on the respiratory system and has been associated with bone disease.[15,16]

The soil cadmium concentration in farmland and residence of farmers and households were lower than the limit values of National Environment Board (NEB), Thailand at 37 mg/kg.[17] The median of soil cadmium concentration in households' resident soil, farmers' resident soil, farmland soil were 0.021, 0.018 and 0.152 mg/kg respectively. This result was different with the survey of the International Water Management Institute (IWMI) with the Thailand Department of Agriculture that soil cadmium concentrations in two phases from 1998 to 2003 were higher than limit values of NEB at 284 and 218 mg/kg respectively. The result was different from this study. In IWMI's study, the sampling area is located nearby the mining area. Cadmium compound was mainly related with zinc ores.[5,11] However, the cadmium concentrations in soil of IWMI were higher than those found in this study. It might be from the difference in the sampling collection period in this study. The flooding might cause the reduction of soil cadmium concentration. However, it was agreed with the study of Weeraprapan P,[18] as it was shown that cadmium concentration in sediment of downstream area (0.84 and 2.47 mg/kg) were higher than those of upstream area (5.32 and 7.86 mg/kg). The result was agreed with this finding. The sampling period was similarly collected on February 2012.

The water cadmium concentration in farmland and resident were lower than the limit values of NEB, Thailand at 0.005 mg/l.[19] It was agreed with the study of Krissanakriangkrai, *et al*,[20] showing that the rainy season demonstrated highest water cadmium concentration, but the level found was lower than the limit values of NEB at 5 µg/l. This might be due to the increase in storm water and industrial runoff occurring in this period of time. However, it was different from the study of Akkajit.[21] It showed that water cadmium concentrations in rainy season (0.028-0.032 mg/l) were higher than in dry season (0.005-0.006 mg/l) because the surface water in Mae Tao creek might pass through the Zn mining area and it would be accumulated in sediment. The result demonstrated high level of cadmium concentration in working area namely farmland soil and water.

The comparison of cadmium concentration in farmer's farmland soil and resident soil had no statistically difference and showed farmland soil had higher cadmium concentration than resident soil at p value = 0.225. However, the comparison of cadmium concentration in farmer's farmland water and resident water had no statistically difference and showed farmland water had higher cadmium concentration than resident water at p value = 0.345. The cadmium concentrations in all samples among farmers and households were far below the limit values.

The limitation of this study was the period of data collection. It could only be conducted on February 2012 because of the availability of staff working in this study area. Moreover, this area just experienced flood from October 2011 to January 2012. Another limitation was the analysis would be performed in queue, therefore, all of samples were stored for almost one month.

## Conclusion

Concentration in farmland soil and water showed highest concentration compared to farmers and households' resident soil and water. The cadmium concentrations in all samples were remarkable far below the limit values. This study clearly showed that the working conditions of farmer demonstrated higher level of cadmium compared to the living conditions. The cause of this contamination might be from the activities of the surrounding industry. Therefore, it would be recommended that farmers should consider for cadmium exposure while working in farm.

## Acknowledgement

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# Study on Clinical, Histopathological Features and Evaluation Results of Skin Cancer Treatment in Can Tho Oncology Hospital

## Penelitian pada Fitur Klinis, Histopatologis dan Hasil Evaluasi Pengobatan Kanker di Rumah Sakit Onkologi Can Tho

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**Abstract**

Skin cancer as the most common cancer diagnosis tend to be increasing. This condition is a particularly significant issue in developed countries. This study aimed to describe the clinical features, histopathological features, complications, and early surgical treatment outcomes of skin cancer in Can Tho Oncology Hospital from 2014 to 2015. This descriptive prospective study involved all patients with non-melanoma skin cancer that were examined and treated at Can Tho Oncology Hospital from July 2014 to March 2015. There were 78 cases selected. Skin cancer was found to be more common among older patients. The prevalence of basal cell carcinoma was found higher than squamous cell carcinoma with percentage worth 76.9% and 23.1% respectively. Worth 73.1% of all the patients in the study underwent surgery with wide resection and reconstruction. In this study, most patients were the elderly. The basal cell carcinoma was the most common. The main treatment was surgery with wide resection and reconstruction. The complication was rare 1.3% with skin flap necrosis.

**Keywords**: Basal cell carcinoma, clinical features, histopathology, skin cancer, squamous cell carcinoma

**Abstrak**

Kanker kulit, diagnosis kanker paling umum, cenderung mengalami peningkatan. Kondisi ini secara khusus merupakan isu penting di negara-negara maju. Penelitian ini bertujuan untuk mendeskripsikan fitur klinis, fitur hispatologis, komplikasi dan hasil pengobatan bedah awal kanker kulit di Rumah Sakit Onkologi Can Tho dari tahun 2014 sampai 2015. Penelitian deskriptif prospektif ini melibatkan seluruh pasien dengan kanker kulit non-melanoma yang diuji dan diobati di Rumah Sakit Onkologi Can Tho dari Juli 2014 sampai Maret 2015. Terdapat 78 kasus terpilih. Kanker kulit ditemukan lebih umum pada pasien yang lebih tua. Prevalensi karsinoma sel basal ditemukan lebih tinggi dibandingkan karsinoma sel skuamosa dengan persentase masing-masing 76,9% dan 23,1%. Sebesar 73,1% dari seluruh pasien dalam penelitian ini menjalani bedah dengan rekonstruksi dan reseksi yang lebar. Dalam penelitian ini, sebagian besar pasien adalah lanjut usia. Karsinoma sel basal adalah yang paling umum. Pengobatan utama adalah bedah dengan rekonstruksi dan reseksi yang lebar. Komplikasi jarang terjadi 1,3% dengan nekrosis lipatan kulit.

**Kata kunci**: Karsinoma sel basal, fitur klinis, histopatologi, kanker kulit, karsinoma sel skuamosa

### Introduction

Skin cancer, as the most common cancer diagnosis tend to be increasing. This condition is a particularly significant issue in developed countries. In Australia, the incidence of squamous cell carcinoma (SCC) is so far the highest in the world over 1,000 cases per 100,000 residents.[1] In Vietnam, the number of the outpatient and inpatient witnessed the upward trend as the data in 2010 showed an increase by 2.6% than in 2007.[2] In Can Tho City, skin cancer ranked the second among 10 most common cancers in term of gender.[3] Long term of sun exposure has mainly caused skin cancer. However, there are few studies to address the recent clinical features as well as histopathological features of skin cancer. The study aimed to explore the clinical features, histopathological features, complications of patients with skin cancer and early surgical treatment outcomes of skin cancer in Can

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Tho Oncology Hospital from 2014 to 2015.

## Method

Medical records for all skin cancer patients as confirmed by histologist that had surgery at Can Tho Oncology were identified. This descriptive study evaluated the primary outcomes of surgery by following up the patients about complications after surgery, free margin and functional and aesthetic primary results. Medical records were for 78 patients with basal cell carcinoma (BCC) and SCC. The 78 patients variable included gender, age, occupation, residence, period of the disease, the main complaints, prominent skin lesions, site of these lesions and the rate of histological type as well as the stage of the skin cancer. This study examined the patients and collected the records together with necessary laboratory tests. After that, this study had a diagnostic about the stage of the skin cancer. According to the clinical protocol, if the patients did not have any underlying disease or those under good control, the patients may undergo the surgery. The method of surgery would mainly depend on the site of lesion, the stage of disease, the general health of patient, the histological type and other factors.

Study tools used were the medical record paper in Can Tho Oncology Hospital and the inquiry. Data was analyzed using software Statistical Package for the Social Sciences (SPSS) version 18.0. The entire patients who received the explanation for the aim of the study took part voluntarily.

## Results

There were 78 patients with skin cancer included. Skin cancer frequently occured in the over 60 aged groups, with the highest percentage 71.7%. The oldest patient was 101 years old. The mean aged was 72 years old. The male/female ratio was 0.9. The majority of the patients work as a farmer, which was illustrated by 91%. Worth 66. 7% of the patients lived in rural areas.The chief complaint: the most popular complaint was ulceration (34. 6%), closely followed by itching (25.6%). Face and neck skin were the most common sites worth 66. 7%. Particularly, the carcinoma on the face skin mostly located on around the nose and cheek (57. 9%). BCC was the most common skin cancer by 76. 7%, followed by squamous cell carcinoma by 23. 1%. BCC had an onset time of over one year in 70% of cases. SCC had an onset time of less than one year in 56.6% of cases (Table 1).

Worth 70% of tumors in the scalp and 94.2% face and neck skin were found to be BCC and 70% of tumors found on the skin of the limbs were found to be SCC (Table 2). Worth 90% of BCC case the tumors were under five centimeter diameter and 29% of the SCC case were more the tumors than five centimeter (Table 3).

The main treatment for skin cancer is surgery with wide resection and reconstruction by skin flap. This was illustrated by 73.1%. Another method is surgery with wide resection and reconstruction. Worth 1.3% patients experienced the skin graft. Complication such as skin flap necrosis was noted in one case (1.3%). Worth 9% of patients was found positive in an area cut and 85.7% of these area cuts occurred in the face and neck. All patients were interviewed upon discharge from the hospital and 92.3% reported that their functions and aesthetics after surgery were very good.

**Table 1. The Correlation between The Histophatological Type and Duration**

| The Duration | BCC (%) | SCC (%) |
|---|---|---|
| Under 1 year | 17 (30) | 10 (56.6) |
| From 1 to 5 years | 32 (53.3) | 4 (22.2) |
| From 5 to 10 years | 6 (10) | 3 (16.7) |
| Over 10 years | 4 (6.7) | 1 (5.6) |
| **Total** | **59 (100%)** | **18 (100%)** |

**Table 2. The Correlation between The Histophatological Type and Site**

| Variable | BCC (%) | SCC (%) |
|---|---|---|
| Scalp | 70 | 30 |
| Face and neck skin | 94.2 | 5.8 |
| Limb skin | 30 | 70 |
| Trunk skin | 17 | 83 |

**Table 3. The Correlation between The Histopathological Type and Size of Tumor**

| Size of Tumor | BCC (%) | SCC (%) |
|---|---|---|
| Tumor diameter (TD) $\leq$ 2 cm | 53.3 | 7.8 |
| TD from 2 to 5 cm | 36.7 | 50 |
| TD $\geq$ 5 cm | 5 | 22.2 |
| Tumor invades the muscle, bone | 5 | 0 |
| **Total** | **100%** | **100%** |

## Discussion

This study had recorded that 73.1% of patients were over 60 years old. The mean age was 72 years old. From that point, it is considered that the elderly was one of the skin cancer etiology. The explanation was long term exposing the sun light. In addition to this, the ability to fix the genetic mutation was weakening.[4]

In term of the main complaint, the most popular complaint was ulceration (34.6%), closely following itching (25.6%). A smaller percentage was accounted by pain (5.1%). According to the author Nguyen Dai Binh, the symptoms that warn the skin cancer is ulceration. However, most of patients did not have painful symptoms, which might be the reason why they admit the hospital at the late stage.[5] According to the author Kyle, itch was the most common symptom reported in both skin cancers (43.5% of SCCs and 33.4% of BCCs). The

prevalence of pain was 39.8% in SCC and 17.7% in BCC. Their findings revealed that pain and itch were common symptoms of non-melanoma skin cancer.[6]

Face and neck skin were the most common sites worth 66.7%. Particularly, in the face skin, the carcinoma was mostly located around the nose and cheeks (57.9%). It was 70% BCC patients who had period over one year, while the SCC patients had shorter period by 56.6% patients less than one year. The natural record of BCC is that of the slowly enlarging. In term of BCC, the size of the tumor is under five centimeter nearly 90% and no case was reported nodal metastasis. In another study, SCC had a rapid growth by 45% patients who had period under one year.[2] This study noted that 5.6% cases were nodal metastasis in comparison to other studies, the rate of nodal metastasis was higher by 18%.[7] The discrepancy is the aim of the study and the study population. This study also collected the entire skin cancer patients confirmed by histologist.

Wide resection and reconstruction by skin flaps were performed by 71.8%. The methods of surgery were complicated, which depended on the site and the size of tumor. Worth 9% of unsafe border reported in this study was mainly located in the face and neck skin. In contrast, other studies declared the lower rate in unsafe border. The explanation is that the mean diameter of the tumor in this study was two centimeter smaller.[8-10] Another explanation was this study had been conducted recently, meanwhile health care system was in more improvement. In addition, physicians also had a variety of choices with antibiotics. The primary results of aesthetic and function were excellent (92.3%). A complication such as skin flap necrosis was noted in one case (1.3%).

## Conclusion

This study finds that skin cancer is frequently diagnosed late in the patient's life as most of patients are elderly. Therefore, the early detection should be encouraged. BCC is the most common skin cancer, but this type has long period. The main treatment is surgery with wide resection and reconstruction. Complication such as skin flap necrosis is rare at only 1.3%.

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# Knowledge and Behavior Change of People Living with HIV through Nutrition Education and Counseling

## Perubahan Pengetahuan dan Perilaku Orang yang Hidup dengan HIV melalui Konseling dan Edukasi Gizi

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**Abstract**

HIV, AIDS and nutrition are interconnected. In the HIV Integrated Care Unit of Dr. Cipto Mangunkusumo Public Hospital, nutrition education and counseling services are provided within a collaborative service for people living with HIV (PLWH). This study aimed to determine influence of nutrition education and counseling to knowledge and behavior of PLWH. This study was conducted with quasi experimental design using treatment and control groups. The treatment group consisted of 25 samples and 29 samples for control group. Samples were adults between 18 – 50 years old selected by applying inclusion and exclusion criteria. A pretested questionnaire was used to assess knowledge. Paired t-test sample was used to analyze data. This study was conducted on May – July 2014. Based on results of this study, there was effect in form of knowledge change (p value = 0.000) with score 6.38 point lower on the control group and any significant differences in behavior change (p value = 0.048) for the treatment group after receiving nutrition education and counseling. This study shows that nutrition and counseling using media of education which is more complete and continuously provided may improve knowledge and change behavior of PLWH.

**Keywords:** Behavior, counseling, education, knowledge, people living with HIV

**Abstrak**

HIV, AIDS, dan gizi saling berhubungan. Pada Unit Pelayanan Terpadu HIV Rumah Sakit Umum Pusat Nasional Dr. Cipto Mangunkusumo, layanan edukasi dan konseling gizi disediakan secara kolaboratif untuk orang yang hidup dengan HIV. Penelitian ini bertujuan untuk mengetahui pengaruh pendidikan dan konseling gizi terhadap pengetahuan dan perilaku orang yang hidup dengan HIV. Penelitian ini dilakukan dengan desain kuasi eksperimental menggunakan kelompok perlakuan dan kontrol. Kelompok perlakuan terdiri dari 25 sampel dan 29 sampel untuk kelompok kontrol, dilakukan sebelum dan setelah perlakuan. Sampel berusia dewasa antara 18 – 50 tahun dipilih dengan menerapkan kriteria inklusi dan eksklusi. Sampel uji-t berpasangan digunakan untuk menganalisis data. Penelitian ini dilakukan pada bulan Mei – Juli 2014. Berdasarkan hasil penelitian, diketahui bahwa adanya efek berupa perubahan pengetahuan (nilai p = 0,000) dengan nilai 6,38 poin lebih rendah pada kelompok kontrol dan terdapat perbedaan yang signifikan dalam perubahan perilaku (nilai p = 0,048) untuk kelompok perlakuan setelah menerima edukasi dan konseling gizi. Penelitian ini menunjukkan bahwa edukasi dan konseling gizi menggunakan media edukasi yang lebih lengkap dan diberikan secara berkelanjutan dapat meningkatkan pengetahuan dan mengubah perilaku orang yang hidup dengan HIV.

**Kata kunci:** Perilaku, konseling, edukasi, pengetahuan, orang yang hidup dengan HIV

### Introduction

Human immunodeficiency virus (HIV), acquired immune deficiency syndrome (AIDS) and nutrition are interconnected in which condition of HIV and AIDS contributes to malnutrition and the malnutrition condition may have a negative effect on people living with HIV/AIDS (PLWHA). Malnutrition affects the strength and disrupted body immune system resulting susceptibility to infectious diseases, hence increase nutritional needs. The side effects of malnutrition that can cause inability to meet nutritional needs may lead patients to eas-

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ily get infection risk, proving the strong relation between nutrition, HIV and AIDS.[1-3] Less nutrition and HIV infection have a negative effect on individuals, households and the environment as well, rising from a decrease in clinical condition, nutrition status, quality of life and economic condition.[2] Obviously, nutrition plays an important role in maintaining the health and immune system and to slow the progress of HIV to AIDS.[4]

Moreover, as a consequence of HIV infection, malnutrition also increases the prevalence of cardiovascular disease and insulin resistance among people living with HIV (PLWH) after receiving antiretroviral therapy (ART). This is also an issue of concern.[2,5] ART aims to slow replication but does not eliminate the virus. PLWH are able to maintain quality of and prolong their life, but they must be in a condition that includes ART, other drugs and food consumption which affect their absorption, metabolism, distribution and excretion resulting a less favorable circumstances.[1]

A study in Tanzania observed that the prevalence of metabolic syndrome was higher in urban than rural areas among individuals living wih HIV and receiving ART. They also observed that components of metabolic syndrome including high blood level of triglycerides, low blood levels of high-density lipoprotein (HDL) and raised fasting blood glucose were significantly high among study participants from urban than those from the rural areas. The traditional predicting risk factors including high level of education, gender and being past or current alcohol consumer significantly predicted the prevalence of metabolic syndrome among participants in the urban area. This study suggests an intervention to prevent the risk, such as reduction of body weight, eating healthy diet and participating at moderate or vigorous intensity activities.[6]

Relation between HIV and malnutrition greatly affects the progress of the disease among PLWH, and interactions that occur may decline health status, nutritional status, quality of life and ultimately affect the productivity of family. At individual level, malnutrition is caused by inadequate intake, then the direct effects are metabolism problem of nutrients at the stage of absorption, storaging and utilization of nutrients in the body which could harm the immune system causing nutrient deficiency and development of infectious diseases.[1]

In improving condition of PLWH through optimization of nutritional status, it is necessary to intervene with health promotion including nutrition education and counseling.[1] The nutrition intervention program includes nutrition assessment, nutrition education and counseling, food assistance, micronutrient supplementation and activities to strengthen household food access addressed to PLWH.[7]

Theory of planned behavior known as the theory of reasoned action which is an individual's health behavior is directly influenced by intention to engage in that behavior. Three factors affecting behavioral intention include attitude, subjective norm and perceived behavioral control.[8]

The HIV Integrated Care Unit of Dr. Cipto Mangunkusumo Public Hospital collaborates services including nutrition education and counseling services targeted to PLWH. The aim of collaborating such services is to improve and maintain optimal nutritional conditions that may support general health. This study aimed to determine effects of nutrition education and counseling on knowledge and behavior of PLWH.

**Method**

A quasi-experimental study was conducted between May and July 2014 with one group using pretest and posttest design. Analysis was based on data from knowledge and implementation of energy intake, food habit and food safety. Respondents were adult patients (18 – 50 years old). Respondents (n = 54) were out patients who came to HIV Integerated Care Unit of Dr Cipto Mangunkusumo Hospital Jakarta with inclusion and exclusion criteria. Inclusion criteria were ability to communicate and willing to attend nutrition education and counseling every two weeks. Exclusion criteria were HIV positive with stage 3 and 4 based on World Health Organization (WHO)'s criteria, getting pregnant, not already receiving ART and suffering a chronic disease that affects the diet, such as diabetes mellitus, hypertension and heart disease. This study received ethics and permits approved by Faculty of Medicine Universitas Indonesia Ethical Commitee for Research and the obtained informed consent from each respondent.

Knowledge assessment was conducted by providing a questionnaire consisting of a of 30 questions regarding nutritional needs, how to choose good food and food safety. This instrument was tried out and validated prior to the data collection. The questionnaire was filled by each respondent accompanied by a pretrained enumerator.

Behavior was assessed in four stages. The first stage was to determine intake of energy and macronutrients by using a single 24-H food recall and analyzed using Indonesian food composition table. The second stage was comparing to individual needs to find out any compatibility. The third stage was assessing the suitability of the proportion of energy intake and macronutrients with balanced nutrition principles. The fourth stage was assessing implementation of food safety by using a questionnaire consisting of 20 questions about food safety behavior. The fourth step considered as behavior was assessed twice, before and after the intervention.

The intervention group received nutrition education in the first week by providing booklet 1 containing indi-

**Table 1. Energy Intake, Intake Score, Dietary Habit Score and Food Safety**

| Variable | Category | Before Intervention Mean ± (SD) | p value | After Intervention Mean ± (SD) | p value | Mean ± (SD) | p value[a] |
|---|---|---|---|---|---|---|---|
| Energy intake (Kkal) | Intervention (n = 25) | 1666 ± (220) | 0.622 | 1722 ± (184) | 0.002* | 56.04 ± (125.27) | 0.944 |
| | Control (n = 29) | 1683 ± (229) | | 1736 ± (181) | 0.050 | 53.03 ±(177.40) | |
| Intake score[b] | Intervention (n = 25) | 64.00 ± (16.26) | 0.284 | 74.00 ± (16.26) | 0.002* | 10.00 ± (14.43) | 0.345 |
| | Control (n=29) | 68.96 ± (17.23) | | 75.00 ± (17.67) | 0.050 | 6.03 ±(15.88) | |
| Dietary habit score[c] | Intervention (n = 25) | 52.00 ± (10.00) | 0.011 | 68.00 ± (10.00) | 0.003* | 16.00 ± (23.80) | 0.55 |
| | Control (n = 29) | 56.89 ± (17.54) | | 60.34 ± (17.67) | 0.424 | 3.44 ± (22.87) | |
| Food safety[d] | Intervention (n = 25) | 82.80 ± (13.07) | 0.991 | 89.20 ± (10.00) | 0.015* | 6.40 ± (12.20) | 0.015* |
| | Control (n = 29) | 82.75 ± (13.86) | | 81.72 ± (11.04) | 0.522 | -1.03 ± (8.59) | |

*p < 0.05

[a]p value is from paired simple t-test indicating differences in food safety score by intervention group and control; [b]Intake score is defined as energy intake 80 – 110% from energy needs (score 100) and energy intake < 80% and > 110% from energy needs (score 50); [c]Dietary habit score is defined from score 100 if it suitable from balance diet composition for energy and macronutrient, score 75 if it suitable from balance diet composition for energy or macronutrient, score 50 if it unsuitable from balance diet composition for both of energy or macronutrient; [d]Food safety is defined as scrore based on questionnaire and it contains score 0 – 100.

**Table 2. Knowledge and Behavior**

| Variable | Category | Before Intervention Mean ± (SD) | p value | After Intervention Mean ± (SD) | p value | Mean ± (SD) | p value[a] |
|---|---|---|---|---|---|---|---|
| Knowledge[b] | Intervention (n = 25) | 81,20 ± (17,15) | 0,111 | 89,60 ± (17,15) | 0,000 | 8,40 ± (9,4) | 0,000* |
| | Control (n = 29) | 87,58 ±(11,54) | | 86,55 ±(8,97) | 0,477 | -1,03 ±(7,7) | |
| Behavior[b] | Intervention (n = 25) | 66,24 ± (8,68) | 0,166 | 73,64 ± (13,45) | 0,000 | 7,50 ± (8,71) | 0,049* |
| | Control (n = 29) | 69,55 ± (8,59) | | 72,00 ± (11,04) | 0,171 | 2,55 ± (9,40) | |

*P value = 0.05

[a]P value is from paired simple t-test indicating differences in food safety score by intervention group and control; [b]Knowledge is defined as score based on questionnaire and it contains score 0 – 100; [c]Behavior is defined as score based on average score from intake, dietary habit and implementation of food safety.

vidual nutritional needs and the list of foodstuff exchanger. At the second week, the respondents attended nutrition counseling and to evaluate the implementation of nutritional advice. In the third week, the respondents came for the second nutrition education by getting booklet 2 containing guidance to choose any good food for daily eating and booklet 3 containing food security. In the fourth week, the respondents were evaluated. The control group were only asked to come during the pretest and received a flyer containing the recommended balanced nutrition and during posttest for the next four weeks. According to standard procedures, the balanced nutrition flyer was distributed in accordance with HIV patients without nutritional problems.

## Results

### Characteristics of Samples

Demographic data was defined by characteristics including age, sex, education, occupation and family support. Respondents in the age of 20 to 59 years in which 57% were 30 – 39 years old (n = 31). Based on gender, women respondents were 56.4% (n = 31). The respondents who attained high school were 18 (72%) in the treatment group and 19 (65.5%) in the control group. Most respondents were employed and having regular income (60%) in the treatment group and 17 (58.5%) in the control group. Respondents worked as teacher, employee, non-governmental organization (NGO) workers and labors. Family support/peer group were 21 (84%) in the treatment group, and 23 (79.3%) in the control group. There was no any significant difference according to the characteristics between those two groups of respondents (p value > 0.05).

### Knowledge and Behavior

According to Table 1, knowledge and behavior showed charateristics as well as proportion above specified reference values.

Before the intervention, there was no signficant difference for both groups in energy intake, dietary habit and food safety implementation. After intervention, there were significant changes found in energy intake in the treatment group (p value = 0.002), energy intake score (p value = 0.002), diet (p value = 0.003) and food safety (p value = 0.015). The differences before and after the intervention in both groups were seen in the implementation of food safety (p value = 0.015). Table 2 included results of subsitution from the fourth part of values above as behavior and knowledge before the intervention. There was no significant difference in knowledge and be-

havior in both groups. After the intervention, the result showed significant differences of knowledge and behavior and no significant differences for control group that stated the same condition for each group.

**Discussion**

There were 56.4% women included in this study. According to Indonesian HIV/AIDS statistical data, there were 30% of women living with HIV/AIDS until December 2013.[9] If it is associated with HIV, women are much easier to experience epidemic than men related to biological, sociocultural and economic reasons.[10] The education levels in this study were senior high school 68.5% and the remaining was both secondary school and college. Education level may influence behavior in choosing his/her lifestyle, particularly related to food and nutrition. In the study that took students as samples, there was a relation between parents' education level and their children's nutritional status. Education took a part in influencing food provision in the household level.[10] About 59% of diverse occupations was described in this study. They were private employees, teachers, volunteers at community social institution, labors, and self-employed. People work to fulfill their daily needs including food by expanding their job income. According to the Joint United Nations Programme on HIV/AIDS (UNAIDS) 2002, treatment costs for PLWHA can discard family's savings much more than the deaths caused by ailments in a short time or an accident. Family sustainability will disappear, especially when the parents (of PLWHA) are died.[11] About 81% of the total of sample gain support from their family. Family support is one of the important non-pharmacological therapy for someone potentially suffers from depression.[12]

The pretest resulted no difference of knowledge between the two groups were found before the intervention (p value = 0.111). After nutrition intervention was performed to the treatment group, this group had changed (p value = 0.000), while the control group which was not performed intervention had not changed (p value = 0.477). The comparison of value change was statistically different (p value = 0.000). It means there was any influence of performing nutrition education and counseling in enhancing knowledge of PLWHA. Knowledge is a factor that contributes to create a behavior. It is usually obtained from the involvement of seeing and hearing sense. These senses become important domain in creating behavior.[13] Study conducted in West France among adult men showed there was a relation between eating pattern knowledge and food choice related to eating behavior.[7]

Study conducted in Uganda among women with HIV positive showed performing nutrition education and knowledge regarding nutritious foodstuffs perceived effectively work through grouping foodstuffs approach, for example, each group of flour, source of protein, fruits, vegetables and food in accordance with season. This method was able to improve their knowledge about foodstuffs (p value = 0.006) and eating schedule (p value = 0.002).[14] The result was in accordance with this study showing the answer upon the questions about that group did not know energy source food declining to 36% from 44%. Likewise, that group did not know vitamin source food declining to 24% from 36% after intervention was performed. This study also obtained difference result of 9 right answers of 10 questions between the treatment group and the control group.

The study using the theory of planned behavior to influence the food consumption behavior found that respondents who were well-informed about food additive and processed food had a positive food consumption attitude to those kinds of food. It also showed that there was a difference of the food containing additives selection between the well-informed group and the less-informed group (p value = 0.002).[15] The study of adult attitude to milk consumption had concluded that nutrition education needed to focus on the behavior changes and diminishing any barriers which affected their consumption of milk.[16] In such theory of planned behavior, attitude is a way in the direction of behavior. The attitude is formed as a degree for people to evaluate which behavior that will give advantage or disadvantage and good or bad for them to take a decision toward behavior. When someone considered the processed food and food contained additives were safe to consume, they would have the intention to consume those kinds of food. Somehow that attitude was also controlled by the norms surround them.[3] The study results on PLWH had found that there were attitude changes to the implementation of food security education for PLWH. The education support used problem-solving approach for common problems and motivation support from the health personals.[13]

The three kinds of behavior assessed in this study contained intake adequacy compared to the individual needs, food source selection and food security. Applied daily skills to handle food and beverage, the capacity to overcome the food access and ability of food preparation were behaviors that became a concern in this study.[17] Particular lessons were needed in order to get the desired skills. The objective of the lessons was supplying the knowledge as provisions to change someone's behavior. The study had shown that there was no difference of the nutrient intake in the after and before the intervention for both groups (p value = 0.622), meanwhile after the intervention, there was a difference of nutrient intake of the exposed group (p value = 0.002). Nutritional needs topic as the nutrition education aimed to improve nutrient intakes of PLWH. The result in eating pattern had

shown that there was a difference in eating pattern after nutrition intervention (p value = 0.003). From the answered questions by the PLWH, there were significant differences on the answers of questions related to the attention of packaged food and beverage, the way to store raw foods and the food selection while eating out. The results were also in line with the study on food security after the intervention (p value = 0.015). Food security for PLWH really needs special attention because they are very susceptible to food-related infectious disease, such as chronic diarrhea which can exacerbate their condition. Usually, such condition derived from the raw food consumption or half-cooked food consumption. Several ways to avoid that condition are by processing every food until it is fully-cooked before eating, particularly food like meats, fishes, poultries; storing the food sources carefully to avoid the cross-contamination; and boiling the water. Therefore, the right knowledge of food security is needed.[18]

After these three aspects were observed, the results showed that behavior had changed, by the intervention such as education and counseling (p value = 0.015). This kind of behavioral change is one of the basic skills for living healthier, though they need another compliant aspect like taking an ARV. Study of the women's group in Uganda had shown that the food selection pattern in the household level had changed after they received the training about the importance of nutrition for PLWH and balance nutrient knowledge. The flour consumption is higher than the fruits and protein source prior to the study. The relation between knowledge support of skills to differ each food source by their group, nutrition comprehension (p value = 0.006) and eating schedule had been proven significant (p value = 0.002).[18]

## Conclusion

As a conclusion, nutrition education has a significant relation with the increasing nutrition knowledge and behavior. Nutrition intervention as a part of nutrition care as processed by providing nutrition education and counseling may increase nutrition knowledge and behavior of PLWH. Continuous education is a good method to be gradually provided in accordance with the needs of the PLWH and it can be sustainable. Since PLWH are in healthy condition, the provision of education is needed because this can help maintain their condition. Therefore, this should be immediately implemented before they come with nutritional problems.

## Recommendation

Nutrition counseling on nutrition education should be provided to support the establishment of good nutrition behavior and help PLWH to face problems related to nutrition. Supportive and collaborative process between client and counselor in improving food, nutrition and physical activities in which the individual goals and plans are approved by the client will help to organize individual treatment plans as addressed to achieve optimal health.

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# Communication of Parents, Sexual Content Intake and Teenage Sexual Behavior at Senior High School in Banjarmasin City

## Komunikasi Orangtua, Asupan Muatan Seksual dan Perilaku Seksual Remaja di Sekolah Menengah Atas Kota Banjarmasin

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**Abstract**

Free sex behavior among teenagers in Banjarmasin City is currently more worrying parents. Lack of sex education affects teenagers tend to commit premarital sexual intercourse that will cause unintended pregnancy and early marriage. Parent-child communication and exposure of both printed and electronic media are the way to reduce risky sexual behavior. This study aimed to determine correlation between communication of parents and sexual content intake with sexual behavior of teenagers at senior high schools (SHS) in Banjarmasin City. To reach the aim, analitic survey study with cross-sectional approach was conducted on July – October 2015 at two state SHS and one private SHS in Banjarmasin City. Subject was the second grade of SHS students from three SHS as taken with purposive sampling. Variables of study were teenage sexual behavior, communication of parents and sexual content intake measured using questionnaire. Test reliability was stated with cronbach alpha 0.746. Data obtained was analyzed using chi-square test and logistic regression test. Results showed that communication of parents and sexual content intake affected teenage sexual behavior, meanwhile age, sex and family structure did not affect teenage sexual behavior. A good communication of parents and low intake of sexual content may give a protection against risky sexual behavior among teenagers.

**Keywords**: Communication of parents, sexual behavior, sexual content intake, teenagers

**Abstrak**

Perilaku seks bebas di kalangan remaja Kota Banjarmasin belakangan ini semakin mengkhawatirkan para orangtua. Kurangnya pendidikan seksologi berdampak para remaja cenderung melakukan hubungan seksual pranikah yang akan berakibat pada kehamilan yang tidak diinginkan dan pernikahan dini. Komunikasi orangtua-anak dan paparan media baik media cetak maupun elektronik merupakan cara untuk mengurangi perilaku seksual berisiko. Tujuan penelitian ini untuk mengetahui hubungan komunikasi orangtua dan asupan muatan seksual dengan perilaku seksual remaja sekolah menengah atas (SMA) di Kota Banjarmasin. Untuk mencapai tujuan tersebut, penelitian survei analitik dengan pendekatan potong lintang dilakukan pada bulan Juli – Oktober 2015 di dua sekolah negeri dan satu sekolah swasta di Kota Banjarmasin. Subjek penelitian adalah siswa SMA kelas XI dari tiga SMA yang diambil secara *purporsive sampling*. Variabel penelitian adalah perilaku seksual remaja, komunikasi orangtua, dan asupan muatan seksual diukur menggunakan kuesioner. Reliabilitas uji dinyatakan dengan *cronbach alpha* 0,746. Data yang diperoleh dianalisis menggunakan uji kai kuadrat dan uji regresi logistik. Hasil penelitian menunjukkan bahwa komunikasi orangtua dan asupan muatan seksual memengaruhi perilaku seksual remaja sedangkan usia, jenis kelamin, dan struktur keluarga tidak memengaruhi perilaku seksual remaja. Komunikasi orangtua yang baik dan asupan muatan seksual yang rendah dapat memberikan proteksi terhadap perilaku seksual berisiko pada remaja.

**Kata kunci:** Komunikasi orangtua, perilaku seksual, asupan muatan seksual, remaja

### Introduction

Time changes teenage sexual behavior in dating as things considered taboo by teenagers in a few years ago, such as kissing and sexual intercourse, have been justified by teenagers now and there is a small percentage of them agreed with free sex.[1] Study in Ghana stated that

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worth 32% of teens had sexual intercourse began at the age of 15 years, meanwhile in China at the age of 12 years and in Zimbabwe at the age of 9 years.[2,3] Indonesia Demographic and Health Survey (IDHS) 2012 stated that 9.3% or 3.7 million teenagers claimed they had committed premarital sexual intercourse.[4]

Risky teenage sexual behavior has a serious effect on public health and would burden them throughout life.[5] Teenage sexual behavior, such as sexual intercourse at an early age without a protector and even committed with different partners, put teenagers at risk for unintended pregnancy and sexually transmitted diseases (STDs) including human immunodeficiency virus (HIV), infertility and cervical cancer.[6]

Sexual behavior is all behaviors driven by sexual desire, both with the opposite sex or the same sex. The forms of this behavior may vary, ranging from feeling attracted to dating, courtship and intercourse. Sexual object may be another person, person or self-delusion. Sexual behavior that appears without involving the couple is masturbation.[7]

Risky sexual behavior to health is influenced by several factors that are family, school, peers and community/society. In the family system, a permissive parenting attitude to sex affects risky sexual behavior and as the protection is family closeness and good communication to avoid intercourse.[8]

Parents should always communicate and supervise their children. Difficulty found by teenagers to communicate mainly with their parents causes unexpected sexual behavior. Poor communication of parents is also due to several other factors including teenagers who are not living with both biological parents, lack of parental supervision, lack of religion education (religiosity), low morality as well as the influence of media and peers increase the incidence of risky teenage sexual behavior.[9] The worse communication level between parents and children, the more likely teenagers to commit sexual acts.[7]

The role of parents is very important and should be a role model for teenagers because parents are the first and foremost educators, so it is important for parents to have adequate knowledge of teenage reproductive health. A wise and not scaring way of delivering will make teenagers feel comfortable to discuss reproductive health issues with their parents.[7]

Almost all the people consider that educating children about sex is not an easy task for parents. Parents feel uncomfortable talking to their children about sex. They find it taboo and lack of sexual knowledge, wondering the age such education should be given at.[6] Parents have a fundamental concern that no provision of sexual information that will lead teenagers to experiment with sex. Parents tend to feel shy to educate teenagers about sex. When teenagers do not get sexual information at home, they will seek for sexual information from peers and media, which ultimately may give them a mislead view of teenage sex and deliver on sexual behavior that does not conform to the religious and social norms. [9]

Indonesia Adolescent Reproductive Health Survey 2007 stated that 15% of women and 29% of teenage boys never discussed reproductive health with someone. Those respondents who discussed reproductive health issue mostly discussed the issue with the group. There was 1% of women and 6% of 15 – 24 year-old boys had sexual intercourse. Results of study conducted by The Central Statistics Agency and International on December 2008 acquired 22% of women and 45% of men agreed/accepted premarital sexual relations appeared to have actively sexual intercourse.[10]

Another factor that influence teenage sexual behavior is media exposure. Printed and electronic media environment is closed to the teenagers. Early surveys found that on average, teenagers in the United States spent about six to seven hours per day to use the media, three hours to watch television, two hours to listen to the music, an hour to view the recorded videos and movies, three to four hours to read. Half of all American teenagers in their private room had a television and 16% with the computer. Among 15 – 17 year-old teenagers, 33% used the internet for six hours or more with the calculation worth 24% for three to five hours, 23% for one to two hours and 20% to less than an hour.[11]

Modern families whose parents are always busy and rarely at home left their children at home with television as such an entertainer, a companion and even a nanny for the children. Unfortunately, the television these days tend to be less selective. Impressions during prime time hours often present any soap opera whose the story is inferior as dime novel, intrigue upper-class households, horror, vulgar comedy, etc. Soap opera contains scenes of romance or courtship, sexy, hedonistic life-oriented and plodding paced life always be easy and happy. Teenagers take mass media as a source of sexual information that is more important than parents and peers. Some studies suggest that media have an influence on teenage sexual attitude and behavior.[12]

Results of study in Semarang, Central Java, showed that 12.1% of college students had premarital sexual behavior at risk of unintended pregnancy. There were five variables significantly associated with premarital sexual behavior of students including religiosity, attitude, access and contact with media containing pornography, the attitude and the sexual behavior of close friends.[13]

Data from the Health Agency of Banjarmasin City, South Kalimantan covered data of unintended pregnancy, such as increasing number of case from 35 cases in 2010 jumped to 220 cases in 2011. The data was based on reports of 26 public health centers in Banjarmasin in

collaboration with the school health units. Teenage sexual behavior in 2011 showed 148 cases of premarital sex, 30 cases of reproductive tract infections, 30 cases of sexually transmitted infections (STIs), 220 cases of unintended pregnancy or out of wedlock as well as 325 cases of juvenile labor.[14]

Free sex behavior of teenagers in Banjarmasin lately becomes more worrying parents. Lack of sex education affects teenagers tend to commit premarital sexual intercourse that will cause unintended pregnancy and early marriage. Chief medical officer of Banjarmasin said that frequency of the number of teenage sex behavior is increasing as characterized with more and more juvenile labor in various clinics and a maternity hospital. The cases occurred among teenagers who were still in junior high school and senior high school with the range of age between 16 to 19 years old.[15]

Results of a preliminary study conducted in 10 high school students in Banjarmasin City on January 5th, 2015 obtained the data that six students (60%) said they felt embarrassed to tell personal problems such as dating problems and prefer to tell it to friends, three students (30%) said rarely and only one (10%) who said often. Ten teenagers interviewed were reported always using the internet to mobile phones and electronic media, such as television more than six hours per day.

This study aimed to determine correlation between the intake of parent communication and sexual content with teenage sexual behavior at senior high schools in Banjarmasin. There was a significant relation between communication of parents and sexual content intake with teenage sexual behavior at senior high schools in Banjarmasin City as the hypothesis.

## Method

The design of this study was analytic survey with cross-sectional approach. This study investigated the correlation between communication of parents and sexual content intake with teenage sexual behavior at senior high schools in Banjarmasin City. Subject of this study was the second grade of senior high school students as many as 225 people taken from three senior high schools in Banjarmasin City using a purposive sampling technique. The inclusion criteria were willing to become respondents, living with parents at home, having a close friends/dating with the opposite sex and domiciled in Banjarmasin. Meanwhile, the exclusion criterion was never having a close friend/dating.

The reasons for selecting Banjarmasin as the location of study were because Banjarmasin is the capital city of South Kalimantan, the senior high schools are located in downtown Banjarmasin and the health services data of Banjarmasin covered data of unintended pregnancy, such as the increasing number of case from 35 cases in 2010 jumped to 220 cases in 2011. This study was conducted at three senior high schools in Banjarmasin from July to October 2015.

The dependent variable was teenage sexual behavior as measured using questionnaire concerning sexual activity ever undertaken with a total of 12 units, alternative answers 'yes' and 'no', with a maximum score of 24. The reliability of the test expressed by *cronbach alpha* 0.746. The independent variable was parent communication as measured using questionnaire with a total of 14 pieces, the alternative answers were 'never', 'rarely', and 'often' with a maximum score of 42. The questionnaire asked about the limits during courtship (three problems), the impact of pregnancy (second question), the risk of STDs (2 questions), norms, moral and religion (three problems) and peer (four questions). Variable sexual content intake was measured using a questionnaire amounted to five pieces, alternative answers 'yes' and 'no' with a maximum score of 10. The questionnaire inquired about the intake of sexual content of the printed media, television, the internet and electronic frequency. Reliability of the test expressed by *cronbach alpha* 0.746.

The bivariate analysis using chi-square test was conducted to determine the relation between communication of parents and teenage sexual behavior, also the relation between the sexual content intake and teenage sexual behavior. Multivariate analysis using logistic regression test was conducted to determine other factors, such as age, gender and family structure.

## Results

### Teenage Sexual Behavior, Communication of Parents and Intake of Sexual Content

Most respondents had high-risk sexual behavior worth 51.1%, respondents who had a good communication with their parents worth 57.8%, and respondents who had a high intake of sexual content worth 72,9%. Most of respondents were 16 years old (52.0%), female (66.7%) and 80.4% having a complete family (father and mother) as this can be seen on Table 1.

**Table 1. Teenage Sexual Behavior, Communication of Parents, Intake of Sexual Content, Age, Gender and Family Structure**

| Variable | Subvariable | Total (n = 225) | % |
|---|---|---|---|
| Teenage sexual behavior | High risk | 110 | 48.9 |
| | Low risk | 115 | 51.1 |
| Communication of parents | Bad | 95 | 42.2 |
| | Good | 130 | 57.8 |
| Intake of sexual content | High | 164 | 72.9 |
| | Low | 61 | 27.1 |
| Age | 16 years | 117 | 52.0 |
| | ≥17 years | 108 | 48.0 |
| Gender | Man | 75 | 33.3 |
| | Woman | 150 | 66.7 |
| Family structure | Incomplete | 44 | 19.6 |
| | Complete | 181 | 80.4 |

There was a relation between communication of parents with teenage sexual behavior. Respondents who had poor communication with their parents as much as 57 respondents (60.0%) had high-risk sexual behavior with ratio prevalence value = 2.179, which means that teenagers who had poor communication with their parents would have approximately two times higher risk of high risky sexual behavior than those who communicated well.

There was a relation between the intake of sexual content and teenagers sexual behavior. Respondents who had a high intake of sexual content as much as 90 respondents (54.9%) had high risky sexual behavior with ratio prevalence value = 2.493, which means that teenagers who had high sexual content intake would have approximately two times higher risk of high risky sexual behavior than those who had a low intake of sexual content (Table 2).

There was no relation between external variables and the dependent variable that were the variable age, gender and family structure obtained value p value ≥ 0.05, indicating no significant relation was found between age, gender and family structure with teenage sexual behavior (Table 3).

There was no relation between age and family structure with communication of parents. There was a relation between gender and communication of parents. Men respondents as many as 44 respondents (58.7%) had poor communication with parents with RP value = 2.755, which means that teenage boys would have approximately three times higher risk to communicate poorly with their parents than teenage girls (Table 4).

There was no relation between external variables and the independent variable namely variable age and family

**Table 2. Communication of Parents, Intake of Sexual Content with Teenage Sexual Behavior**

| Variable | Subvariable | Teenage Sexual Behavior | | | | p value | 95%CI |
|---|---|---|---|---|---|---|---|
| | | High Risk | | Low Risk | | | |
| | | n | % | n | % | | |
| Communication of parents | Bad | 57 | 60.0 | 38 | 40.0 | 0.007* | 2.179 |
| | Good | 53 | 40.8 | 37 | 59.2 | | (1.27 - 3.74) |
| Intake of sexual content | High | 90 | 54.9 | 74 | 45.1 | 0.005* | 2.493 |
| | Low | 20 | 32.8 | 41 | 67.2 | | (1.35 - 4.62) |

[a]chi-square test, * ≤ 0.05 = significant, RP = ratio prevalence, CI = confidence interval

**Table 3. Age, Gender and Family Structure with Teenage Sexual Behavior**

| Variable | Subvariable | Teenage Sexual Behavior | | | | p value | 95%CI |
|---|---|---|---|---|---|---|---|
| | | High Risk | | Low Risk | | | |
| | | n | % | n | % | | |
| Age | 16 years | 62 | 53.0 | 55 | 47.0 | 0.251 | 1.409 |
| | ≥17 years | 48 | 44.4 | 60 | 55.6 | | (0.83-2.38) |
| Gender | Man | 38 | 50.7 | 37 | 49.3 | 0.814 | 1.113 |
| | Woman | 72 | 48.0 | 78 | 52.0 | | (0.639-1.937) |
| Family structure | Incomplete | 24 | 54.5 | 20 | 45.5 | 0.504 | 1.326 |
| | Complete | 86 | 47.5 | 95 | 52.5 | | (0.68-2.57) |

[a] chi-square test, * ≤ 0.05= significant, RP = ratio prevalence, CI = confidence interval

**Table 4. Age, Gender and Family Structure with Communication of Parents**

| Variable | Subvariable | Teenage Sexual Behavior | | | | p value | 95%CI |
|---|---|---|---|---|---|---|---|
| | | High Risk | | Low Risk | | | |
| | | n | % | n | % | | |
| Age | 16 years | 47 | 40.2 | 70 | 59.8 | 0.608 | 0.839 |
| | ≥17 years | 48 | 44.4 | 60 | 55.6 | | (0.50 - 1.43) |
| Gender | Man | 44 | 58.7 | 31 | 41.3 | 0.001* | 2.755 |
| | Woman | 51 | 34.0 | 99 | 66.0 | | (1.56 - 4.87) |
| Family structure | Incomplete | 21 | 47.7 | 23 | 52.3 | 0.513 | 1.320 |
| | Complete | 74 | 40.9 | 107 | 59.1 | | (0.68 - 2.56) |

[a] chi-square test, * ≤ 0.05= significant, RP = ratio prevalence, CI = confidence interval

structure with an intake of sexual content. There was a relation between gender and intake of sexual content. Men respondents as many as 64 respondents (85.3%) had a high intake of sexual content with ratio prevalence value = 2.909, which means that teenage boys would have approximately three times higher risk of a high intake of sexual content than teenage girls (Table 5).

Multivariable analysis was conducted to analyze the relation between communication of parents and intake of sexual content with teenage sexual behavior without the involvement of outside variables because based on bivariable analysis, external variables (age, gender and family structure) were not associated with the dependent variable (teenage sexual behavior).

Model 3 was made by combining two independent variables and one dependent variable. This model aimed to examine the relation between communication of parents and intake of sexual content with teenage sexual behavior. Model 3 could predict teenage sexual behavior 69% (Table 6).

## Discussion

Teenage sexual behavior in Banjarmasin City mostly had high risky sexual behavior. Frequent sexual activity by teenagers are holding hands, kissing, hugging, stroking, fondling.[16] Communication of parents with teenagers is an interaction between parents and teenagers in which parents knowingly attempted to provide information about sex.[17] Sexual behaviors of teenagers at senior high schools in Banjarmasin based on the largest to the smallest percentage were holding hands, hugging the shoulders, kissing, spending time with dating partners, hugging the waist, kissing lips, masturbation, touching genitals and breasts, petting, oral genital and sexual intercourse. Premarital sex is the lowest percentage of sexual behavior. The premarital sex was committed with a dating partner and a prostitute.

Parent-teen communication in Banjarmasin was mostly good. Communication of parents with teenagers is very important and parents are the most influential factor on teenage behavior. In theory of social ecology Bronfenbrenner stated that teenage behavior is influenced by the interaction between the teenagers with the environment, policies and norms that exist in the vicinity. Parents and their teenagers need to communicate about the presence of children while outside the home, peers, the activities outside the home, personal problems of children, close friends, religious norms, then they need to discuss limitation that could be done and should not be done during courtship, negative things that would happen if pregnancy occurred during teen age out of wedlock, the prohibition of premarital sex, the risk of sexually transmitted diseases and HIV/AIDS if they had sex before marriage, disgrace and shame of the parents in case of unintended pregnancy. Poor communication between parents and teenagers are caused by several factors, such as the culture. Cultural factors may inhibit communication because parents consider it taboo to talk about sex and think that sex education will further stimulate teenagers to attempt to commit sexual intercourse.[6]

Senior high school students in Banjarmasin mostly got the intake of high sexual content from television.

**Table 5. Age, Gender and Family Structure with Intake of Sexual Content**

| Variable | Subvariable | Teenage Sexual Behavior | | | | p value | 95%CI |
|---|---|---|---|---|---|---|---|
| | | High Risk | | Low Risk | | | |
| | | n | % | n | % | | |
| Age | 16 years | 81 | 69.2 | 36 | 30.8 | 0.257 | 0.678 |
| | ≥17 years | 83 | 76.9 | 25 | 23.1 | | (0.37 - 1.23) |
| Gender | Man | 64 | 85.3 | 11 | 14.7 | 0.005* | 2.90 |
| | Woman | 100 | 66.7 | 50 | 33.3 | | (1.41 - 6.00) |
| Family structure | Incomplete | 34 | 77.3 | 10 | 22.7 | 0.589 | 1.334 |
| | Complete | 130 | 71.8 | 51 | 28.2 | | (0.61 - 2.90) |

[a]chi-square test, * ≤ 0.05= significant, RP = ratio prevalence, CI = confidence interval

**Table 6. Multivariable Analysis**

| Variable | Subvariable | Model 1RP 95%CI | Model 2 RP 95%CI | Model 3 RP 95%CI |
|---|---|---|---|---|
| Communication of parents | Bad | 2.890 | | 2.712 |
| | Good | (0.061 - 0.323) | | (0.049 - 0.308) |
| Intake of sexual content | High | | 2.992 | 2.819 |
| | Low | | (0.075 - 0.366) | (0.062 - 0.350) |
| R | | 0.36 | 0.39 | 0.69 |

Teenage development is influenced by the media as teenagers use media as source of information including information about sex. The mass media can be an educator for sexual development. The charge of sexual intake in the media is also a motivation for teenagers to act sexual behavior. When the sexual behavior is perceived as a normal and interesting stuff, behavior can occur.[12]

The prevalence of teenage sexual behavior at high risk is more common in poor communication of parents compared to good communication. Teenage sexual behavior may also be related to a number of factors from parents. These factors are the parenting process including parents, communication, values of the control, supervision, support and warmth. The frequency of communication of parents is positively associated with teenage sexual health. The intensity of parental supervision in moderation may increase healthy sexual behavior. In developmental psychology, teenage is a very important period in the formation of values, morals and attitudes, as an aspect which develops through the interactions between teenage self and the environment. A social system that is responsible for the earliest developing value systems, morals and attitude to the youth is the parents. Parents expect their children to grow and develop into individuals who own and uphold the values and able to distinguish the good and the bad, and has a commendable attitude and behavior.[16] Good communication between parents and teenagers about sexuality will affect the sexual behavior of teenagers. High risky sexual behavior in teenagers is two times higher among teenagers who communicate poorly with their parents than youth who communicate well with parents. Morality of teenagers also affect their self-control. Teenagers who have a mature moral will have a sense of guilt and shame. Both will control teenage behavior, particularly sexual behavior.[17] This is in line with the theory of planned behavior of Fishbein and Ajzen stating that communication has a great influence in the activities change attitudes, interests, beliefs, opinions and behavior.[18]

Study in Oklahoma City reported that parents and young people who did communication related to the positive behavior of teenagers tend to not commit sexual intercourse or use contraception if sexually active.[19] Another study in the United States found that teenagers who did not discuss sexual health issues to their parents, friends and dating partner had a tendency to have unsafe sexual behavior.[20]

The prevalence of teenage sexual behavior at high risk is more prevalent in teenagers who have a high intake of sexual content compared to teenagers who have low sexual intake. Some factors contributing to teenage sexual behavior are internal, external factors and a mixture of both. Internal factors or that comes from within the individual is the factor getting better nutrition. Good nutrition is increasingly influencing the growth rate and speeding the maturation of hormones. External factors suspected to affect sexual behavior are peers, the impact of globalization, media exposure and cultural materialism. When teenagers begin to understand about sex, sexual content in the media is an interesting thing.[12] The study stated that teenagers who watched television programs with high sexual content tend to commit sexual intercourse than those who watch television with low sex charge as well as teenagers who had sexual experiences tend to seek a charge of sex on television than teenagers who did not have sex experience. Teenagers in entering a period of transition without adequate knowledge of sex and without clear control of parents would give rise to conflicts in teenagers themselves. This is caused by parent who find it taboo to discuss sexual issues with their children, parent and children might have fray relationship that caused children choose an inaccurate source such a friend.[7]

In 2007, Indonesian Institute of Sciences well-known as LIPI presented the study on child's addiction of accessing pornography in the online media and films, VCDs or DVDs and reading porn magazines or books then triggered to have premarital sex. If do not get a proper briefing feared their future is at stake. Ultimately, this will have an effect on sexual development and teenage mental. Another role is the increasing varied printed and electronic media that were also not in accordance with teenage mental development. The role of the family, especially the father and mother are very important in monitoring and control children in term of using media, such as television, newspapers and the internet to prevent young people from negative behaviors. The family is the primary education forum enormously influencing child's development both physical and psychological, therefore the education of children may not be separated from the family because the family is the first place where children learn to assert themselves as social beings interact with the group. Families must have rules and restrictions for children to access the media according to age. Families need to provide assistance and guidance to the children, which should and should not be seen or accessed by children. Family education to children must be applied in the form of surveillance, cultivation of moral values and guidance, so children do not perform negative behaviors and be successful in future days.[21]

Study at high school in the United States found that teenagers were exposed to more sexual content from broadcast media especially the sexual life of teenagers, reportedly have a tendency to have sexual intercourse and other sexual activities.[22] The study stated that the age, gender and family structure did not affect the dependent variable teenage sexual behavior. Study in Nigeria stated that the age, gender, religion and family structure influ-

enced teenage sexual behavior.[16] These results were not in accordance with the theory and only communication of parents and intake of sexual content were associated with teenage sexual behavior. The results showed that teenagers aged 16 years old and ≥ 17 years old had the same percentage to commit risky sexual behavior, male and female have the same percentage to commit risky sexual behavior and teenagers from family structure both complete and incomplete had the same percentage of high risky sexual behavior.

## Conclusion

Good communication from parents and lower intake of sexual content may provide protection against risky sexual behaviors among teenagers. Intake of sexual content more influences teenage sexual behavior compared to communication of parents.

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# Influence of Household Environment and Maternal Behaviors to Upper Respiratory Infection among Toddlers

## Pengaruh Lingkungan Rumah Tangga dan Perilaku Ibu terhadap Kejadian Infeksi Saluran Pernapasan Akut Atas pada Anak Bawah Lima Tahun

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**Abstract**

Upper respiratory infection (URI) in developing countries causes high morbidity among toddlers. Indonesia Health Ministry reported that non-pneumonia acute respiratory infection (ARI) increased by 2.6% from 2007 to 2011. Risk factors which may contribute to URI include environment and behavior. This study aimed to investigate environmental and behavioral factors with URI among toddlers. This case control study was conducted on February – April 2015 among toddlers in Tamansari that is a slum area in Bandung City. Case was 55 mothers with toddlers suffering from URI who came to primary health care, meanwhile control was twice bigger than cases selected from the environment and matched for age, sex and nutritional status. Environmental factors were density, humidity, ventilation, temperature and smoke disposal. Meanwhile, behavioral factors were hand-washing, mother's smoking behavior, the use of mask, vitamin A consumption and exclusive breastfeeding. Results of study showed that environmental factor related to URI was only density with p value = 0.021 and OR = 2.843 (CI 95% = 1.168 – 6.920). None of maternal behavior factor was related to URI. Reducing density is an important and challenging issue in slum area, same as similary health promotion and prevention concerning URI are still necessary to reduce the risk of this disease among toddlers in urban slum area.

**Keywords:** Behavioral factors, environmental factors, toddlers, upper respiratory infection

**Abstrak**

Infeksi saluran pernapasan akut atas (ISPA atas) di negara berkembang menyebabkan morbiditas tinggi pada anak bawah usia lima tahun (balita). Kementerian Kesehatan Republik Indonesia melaporkan bahwa ISPA non-pneumonia meningkat 2,6% dari tahun 2007 ke 2011. Faktor risiko yang dapat berkontribusi termasuk lingkungan dan perilaku. Penelitian ini bertujuan untuk menyelidiki faktor perilaku dan lingkungan dengan ISPA atas pada balita. Studi kasus kontrol ini dilakukan dari Februari-April 2015 pada balita di Tamansari yang merupakan daerah kumuh di Kota Bandung. Kasus adalah 55 ibu dengan balita menderita ISPA atas yang datang ke puskesmas, sedangkan kontrol dua kali lebih besar dari kasus dipilih dari lingkungan dan cocok untuk usia, jenis kelamin, dan status gizi. Faktor lingkungan adalah kepadatan, kelembaban, ventilasi, suhu, dan pembuangan asap. Sedangkan perilaku adalah mencuci tangan, perilaku merokok ibu, pemakaian masker, konsumsi vitamin A dan ASI eksklusif. Hasil penelitian menunjukkan bahwa faktor lingkungan yang berkaitan dengan ISPA atas hanya kepadatan dengan nilai p = 0,021 dan OR = 2,843 (CI 95%: 1,168 – 6,920). Tidak terdapat faktor perilaku ibu yang berhubungan dengan ISPA atas. Pengurangan kepadatan merupakan masalah penting dan menantang di daerah kumuh, sama halnya dengan promosi kesehatan dan pencegahan tentang ISPA atas masih penting untuk mengurangi risiko penyakit ini pada balita di daerah kumuh perkotaan.

**Kata kunci:** Faktor perilaku, faktor lingkungan, balita, infeksi saluran pernapasan akut atas

### Introduction

Acute respiratory infection (ARI) is a common global health problem that causes approximately 4.25 million deaths in the world each year and places the fourth rank as the cause of death at any age after cancer.[1] Moreover, children are suffering from this disease about 6 – 12 times per year. This repetitive frequency causes the

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high number of visits to primary care physicians. In the United States, approximately 25 million patients visited to primary health care and 1.6 million patients came to the emergency section in hospitals every year because of influenza caused mainly by virus.[2,3]

Although ARI can recover by its own without any particular intervention and rarely require antibiotics, not all parents understand that the infection is often overlooked and spread to the lower respiratory tract and middle ear that lead to complications and requiring more complex interventions.[4] Approximately 20% of children with respiratory infections have complications and more than 24% require ongoing consultations. Upper respiratory infection (URI) causes the loss of working days and absenteeism in schools and leading to high morbidity among children. Prevention from this disease is important, but behaviors to prevent the spread of infectious diseases through the transmission medium remains less positive.[5-6]

Indonesia is one of developing countries with 40% of global ARI death rate. This disease is also placed at the first rank due to the cause of Disability-Adjusted Life Year (DALY).[7,8] Indonesia Health Ministry has reported that non-pneumonia ARI has increased by 2.6% from 2007 to 2011.[9] Data from the Basic Health Research in 2013 found that the period prevalence of ARI based on diagnosis of health workers and complaints of residents was 25%. Toddlers were the group aged 1 - 4 years highest among all ages.[1,10]

The period prevalence of ARI in West Java was 24.8% and according to data from the Regional Socioeconomic Survey in 2012, worth to 47.77% of people suffering from respiratory diseases (cough, runny nose, shortness of breath).[10-11] Data from Bandung Health Agency showed an increase of ARI at the age of 1 - 4 years by 86% from 2012 to 2013.[12-13] This suggested that respiratory disease was common among communities in West Java and the incidence was higher among toddlers as its prevalence increased in slum areas with a high density.

Tamansari is a slum area with the highest number of people around the Cikapundung River with 28,729 residents. This area is on the edge of Cikapundung River with the dirty environmental condition. The toddlers living here are more susceptible suffering from respiratory infection. It was reported that there were 817 toddlers suffering from URI in slum areas in Tamansari in 2012.[12] Various factors contribute as risk factors of URI, such as age, sex, birth characteristics, ethnicity, breastfeeding, socioeconomic factors, condition of houses, population density, passive smokers, daycare, and household behaviors.[14-17]

There are two types of ARI namely upper respiratory infection (URI) and lower respiratory infection (LRI). The most common case that occurs among toddlers is URI in which URI is an infection occuring in human upper respiratory tract including nostrils, nasal cavity, pharynx and larynx.[18] URI common symptoms are cough, cold with or without shortness of breath. Other symptoms are hard to breath, sore throats, fever, and earache.[19-20] This study aimed to investigate environmental and behavioral factors related to URI among toddlers in Tamansari, Bandung.

## Method

A case control study was conducted on February to April 2015 in areas located in Tamansari to investigate the relation of household environment and maternal behavior factors significantly contribute to URI among toddlers. Inclusion criteria for the cases were mothers with toddlers suffering from URI aged 0 – 59 months who came to primary health care and diagnosed according to International Code of Diseases (ICD) 10 (J00- J06), having a good nutritional status based on height/weight and willing to participate in the study after signing informed consent of the study. The exclusion criteria for cases were mothers with toddlers aged 0 – 59 months suffering from other concomitant diseases (tuberculosis, asthma, congenital heart disease), having a record of allergy in the family and was not in place at the time of the study. As case there were such 55 patients who met the inclusion criteria and were selected by consecutive sampling.

Two controls were selected from environment of each case. They were mothers with healthy toddlers aged 0 – 59 months in Tamansari environment, not diagnosed suffering from URI and other concomitant diseases such as tuberculosis, asthma or heart diseases, matched for age (more or less three months of the case), sex, and nutritional status same as the case and willing to participate in the study after signing the informed consent of the study. The exclusion criterion was mothers who were not in the place at the time of the study. There were 110 controls chosen by random sampling and the information was collected by visiting children's houses.

Subvariables of household environment were recorded by following the Indonesia Healthy House Evaluation Guidance 2002 for ventilation meter and kitchen smoke disposal.[21] In addition, subvariables were recorded by obeying the Regulation of Health Ministry No. 1077/Menkes/per/V/2011 for temperature and humidity.[22] Subvariables of maternal behavior were measured by questionnaires validated with face validity from two experts and the reliability of the questionnaire was 0.702 of cronbach alpha. Mother's literacy towards knowledge of URI's prevention quetionnaire had reliability 0.742 of cronbach alpha. Mothers' knowledge of URI was measured by 10 items of Health Literacy Skills Instrument (HLSI).[23-24]

Dependent variable was the incidence of URI among toddlers aged 0 – 59 months who were already diagnosed by a doctor/health worker at primary health care with the symptoms of cough with phlegm/mucus/dry, cold, fever or without fever, without the twitching of the muscle wall of the lower chest to the lungs which lasts up to 14 days in accordance with the ICD 10 (J.00 - J.06).

Independent variable was household environment namely ventilation (comparison between the width of air circulation holes from inside to outside and vice versa and the width of entire floors in the house). According to Indonesia Healthy House Evaluation Guidance 2002, healthy house meets the requirements of having more than 10% from the width of entire floors in the house of air ventilation. In case if less than 10%, it does not fulfill the criteria of healthy house. In term of room temperature, according to Regulation of Health Ministry in 2011 for quantitative measurement towards temperature in a room, it meets the requirement if the temperature is between $18^0$ C – $30^0$ C. Then in term of humidity, the vapour size in the room stated by percentage (%) meets the standard if between 40 – 60% Rh based on Regulation of Health Ministry. In term of kitchen smoke disposal, there is kitchen disposal for smoke circulation that meets the criteria if the width is more than 10% from the width of kitchen floor, while it does not meet the criteria if the width is less than 10% from the width of kitchen floor. Furthermore, in term of density comparing the total width of the house and the permanent residents, it is dense if the comparison less than eight meter square).[21]

Maternal behavior factors were hand-washing (behavior of toddlers' mothers who always wash their hands with soap and flowly water before eating, feeding, breastfeeding, after coughing and sneezing, and washing children's hands with soap before and after meals and after playing outside); the use of mask (wearing facial mask as protection from URI which covers nose and mouth by mothers when suffering from URI); mothers' smoking behavior (mother's smoking habits around the house); exclusive breatfeeding (only breastfeeding during the first six months of the babies or according to baby's age under six months during interview); vitamin A consumption (distributing vitamin A from integrated health care on February and August).

Confounding factors were immunization records (immunization given to babies based on to immunization months), mothers' educational background (the latest formal education of mothers), mothers' literacy towards URI (knowledge of URI using 10 items of HLSI and knowledge of URI prevention), low birthweight (newborn baby's weight less than 2,500 gram according to WHO). Chi-square test and binary logistic regression analysis were applied in environmental factors like density, humidity, ventilation, temperature, smoke disposal. Behavioral factors were hand-washing, mothers' smoking behavior, the use of mask, vitamin A consumption and exclusive breastfeeding.

## Results

Table 1 above showed that household environmental factors such as ventilation, temperature, kitchen smoke disposal had no significant relation to URI. However, humidity (p value = 0.043) and density (p value = 0.030) had significant relation to URI and eligible for included in multivariable analysis (p value < 0.25).

Maternal behavior factors, such as hand-washing, the use of mask, vitamin A consumption and exclusive breastfeeding were not significantly related to URI. However, mothers' smoking behavior (p value = 0.097) was eligible for multivariable analysis using binary logistic regression (p value < 0.25) (Table 2).

In the multivariable analysis using binary logistic regression (Table 4), humidity and density appeared as subvariables in the final model. However, density was the most influential factor to respiratory infection related to URI with p value = 0.021 (OR= 2.843; CI 95% = 1.168 – 6.920).

**Table 1. Household Environment and Upper Respiratory Infection**

| Variable | Subvariable | Cases (n=55) | Control (n=110) | p value | OR Crude | 95%CI |
|---|---|---|---|---|---|---|
| House ventilation | Not meet the criteria | 21 (38.2) | 36 (32.7) | 0.487 | 1.270 | (0.647 – 2.492) |
| | Meet the criteria | 34 (61.8) | 74 (67.3) | | | |
| Temperature | Not meet the criteria | 3 (5.5) | 2 (1.8) | 0.334 | 3.115 | (0.505 – 19.219) |
| | Meet the criteria | 52 (94.5) | 108 (98.2) | | | |
| Humidity | Not meet the criteria | 48 (87.3) | 106 (96.4) | 0.043** | 0.259 | (0.072 – 0.926) |
| | Meet the criteria | 7 (12.7) | 6 (3.6) | | | |
| Kitchen Smoke Disposal | Yes, but inadequate | 33 (60) | 43 (39.1) | 0.387 | | |
| | Yes, adequate | 19 (34.5) | 62 (56.4) | 0.748 | | |
| | No kitchen | 3 (5.5) | 5 (4.5) | 0.484 | | |
| Density | Not meet the criteria | 47 (85.5) | 77 (70) | 0.030** | 2.518 | (1.073 – 5.911) |
| | Meet the criteria | 8 (14.5) | 33 (30) | | | |

**Included into multivariable analysis

**Table 2. Maternal Behaviors and Upper Respiratory Infection**

| Variable | Subvariables | Cases (n=55) | Control (n=110) | p value | OR Crude | 95%CI |
|---|---|---|---|---|---|---|
| Hand-washing | < Median | 22 (40) | 46 (41,8) | 0,823 | 1,078 | (0,558 - 2,084) |
| | ≥ Median | 33 (60) | 64 (58,2) | | | |
| The use of mask | < Median | 24 (43,6) | 47 (42,7) | 0,911 | 0,964 | (0,501 - 1,852) |
| | ≥ Median 3 | 1 (56,4) | 63 (57,3) | | | |
| Mothers' smoking behavior | Yes, smoking | 5 (9,1) | 21 (19,1) | 0,097** | 0,424 | (0,151 – 1,193) |
| | Not smoking | 50 (90,9) | 89 (80,9) | | | |
| Vitamin A consumption | No | 4 (7,3) | 5 (4,5) | 0,483 | 1,647 | (0,424 - 6,396) |
| | Yes | 51 (92,7) | 105 (95,5) | | | |
| Exclusive breastfeeding | No | 18 (32,7) | 43 (39,1) | 0,425 | 0,758 | (0,384 - 1,498) |
| | Yes | 37 (67,3) | 67 (60,9) | | | |

**Included into multivariable analysis

**Table 3. Confounding Factors Related to Upper Respiratory Infection**

| Characteristics | Category | Cases (n=55) | Control (n=110) | p value | OR Crude | 95%CI |
|---|---|---|---|---|---|---|
| Educational background | ≤ Graduated from elementary school | 5 (9.1) | 9 (8.2) | 0.757 | | |
| | Graduated from junior high school | 13 (23.6) | 21 (19.1) | 0.472 | | |
| | ≥ Graduated from senior high school | 37 (67.3) | 80 (72.7) | | | |
| URI prevention knowledge | Poor knowledge | 29 (52.7) | 70 (63.6) | 0.178** | 0.637 | (0.331 – 1.229) |
| | Good knowledge | 26 (47.3) | 40 (36.4) | | | |
| HLSI | Inadequate | 22 (40) | 37 (33.6) | 0.421 | 1.315 | (0.674 – 2.568) |
| | Adequate | 33 (60) | 73 (66.4) | | | |
| Baby's birthweight | Low birthweight | 5 (9.1) | 16 (14.5) | 0.322 | 0.588 | (0.203 – 1.698) |
| | Normal birthweight | 50 (90.9) | 94 (85.5) | | | |
| Baby's immunization records | Incomplete | 6 (10.9) | 7 (6.4) | 0.362 | 1.802 | (0.575 – 5.646) |
| | Complete | 49 (89.1) | 103 (93.6) | | | |

**Table 4. Factors Related to Upper Respiratory Infection Simultanuously with Binary Logistic Regession**

| Variable | Subvariables | Coef. B | SE (B) | p value | OR Adj | 95%CI |
|---|---|---|---|---|---|---|
| First model | Humidity (not meet the criteria) | -1.479 | 0.689 | 0.032 | 0.228 | (0.059 – 0.879) |
| | Density (not meet the criteria) | 1.008 | 0.467 | 0.031 | 2.740 | (1.098 – 6.840) |
| | Mothers' smoking behavior (yes, smoking) | -0.695 | 0.550 | 0.207 | 0.499 | (0.170 – 1.469) |
| | URI's prevention knowledge (Poor) | -0.636 | 0.369 | 0.085 | 0.529 | (0.257 -1,091) |
| Final model | Humidity (not meet the criteria) | -1.552 | 0.680 | 0.023 | 0.212 | (0.056 – 0.803) |
| | Density (not meet the criteria) | 1.045 | 0.454 | 0.021 | 2.843 | (1.168 – 6.920) |

## Discussion

Results of this study showed household environmental factors, such as ventilation of the house was not significantly associated with URI (p value = 0.480; OR = 1.27 (95% CI = 0.64 to 2.49)). This means that any comparison with the ventilation around the floor of the house gave the same effect on the incidence of URI among toddlers. The narrow land in Tamansari was one of the factors, so the ventilation became not very significant to URI. House ventilation is one of factors that causes respiratory infection on toddlers among others. No significant association between ventilation and URI could be due to other factors that contribute to this disease, such as the density of the house. House structure in Tamansari is very closed between them. The number of household member in the house was also concomitant factor influencing to URI. The house ventilation qualified with the criteria yet had a higher number of household members would have the same risk with the unqualified house ventilation yet had fewer number of members. A source of transmission of agents and body endurance also affected URI among toddlers. Children with decreasing endurance who lived in the house with qualified ventilation and ill family member could be infected with URI.

This study was different from case-control study on 0 – 5 year-old children who suffered from ARI and looked for treatment at primary health care on March –April 2009 at Karangnongko Klaten Primary Health Care. Results of chi-square test was with p value = 0.000 ($p < 0.05$). This means that there was a significant correlation between ventilation with respiratory infection, in other words, the house with unqualified ventilation was proven to be a risk factor for respiratory disease with the OR = 5.125. It showed that children living in houses with an

area of ventilation that was not eligible had the risk of respiratory diseases 5.125 times higher than with children who lived in houses with qualified ventilation.[25]

Temperature was not significantly associated with URI (p value = 0.330; OR = 3.11 (CI 95% = 0.50 to 19.21)). This means that the temperature of the room in the house had the same effect on the incidence of URI among toddlers. The average of daily temperature in Bandung in the mornings, afternoons and evenings did not experience significant changes. These results together with the results of cross-sectional study in Penjaringan Subdistrict, Rungkut District, Surabaya City in 155 houses. Results of this study suggested that there was no relation between the temperature of the room with the incidence of ARI among toddlers (p value = 0.179).[26] It was different with the result in Finland which suggested that there was a relation between the temperature of the common cold (p value = 0.017) and pharyngitis (p value = 0.011). Every reduction of $1^0$ C would increase the risk of respiratory infection 4.3% (p value = 0.0001) and the common cold 2.1% (p value = 0.004).[27]

Humidity analysis on bivariable using chi-square analysis had p value = 0.043 with OR = 0.259 (CI 95% = 0.072 to 0.926)), using multiple logistic regression, the humidity had p value = 0.023 with OR = 0.212 (CI 95% = 0.056 to 0.803). Humidity had p value < 0.05, but this was not supported by CI value in which lower values below one meaning that there was no significant relation between URI and humidity among toddlers. This showed that the moisture was a protective factor for the incidence of URI. House with unqualified humidity did not cause URI. It was because the children spent most of their times in the house and partly outside the house.

Frequency and duration of children playing outside were other factors that influence the transmission of URI because children could be contagious from their neighbour friends or others outside the house. Air humidity in the house was influenced by weather condition and temperature levels outside the house, how the building is protected from moisture and others as well as leakage, activities such as bathing, steaming, drying wet clothes, etc. Bandung is located at an altitude of 791 meter above sea level, the highest point in the northern region with an altitude of 1,050 meters and the lowest is south side by 675 meter above sea level. Bandung climate is influenced by the humidity of the mountain climate. Average temperature of $23.1^0$ C, average rainfall of 204.11 millimeters, and the number of rainy days on average 18 days per month (situation in 2001).[28]

Kitchen smoke disposal was not significantly associated with URI (p value = 0.310). This means that any comparison with the kitchen ventilation and kitchen floor area had the same effect on the incidence of URI among toddlers. It was influenced by the amount of air pollution generated from biomass burning while cooking in the kitchen. Frequency of presence of children in the kitchen while her mother was cooking was also be one of the factors that must be considered in relation to URI. Another stuff that must be added was measurement of pollutants in the kitchen. Variable the importance of kitchen smoke disposal facilities was actually related to air pollution generated from biomass burning in the kitchen. This result was different from cross-sectional study at the primary health care in North Bangli in 100 houses. Most of the kitchen disposal in the house was unqualified according to health standards. Statistical test using the chi-square showed that the area of house ventilation related to URI with the relation strength was middle scale.[29]

Density was associated with URI on bivariable analysis (p value = 0.030; OR = 2.518 (95% CI = 1.073 – 5.911)) and the binary regression analysis (p = 0.021; OR = 2.843 (95% CI = 1.168 – 6.920). This means that children living in the dense house had 2.843 times higher risk exposed to URI compared with children living in less dense house. This study is the same as case-control study on children aged of 0 – 5 years old who suffered from URI and looked for treatment at Karangnongko Primary Health Care on March – April 2009 in Klaten. Chi-square test results obtained p value = 0.000 (p < 0.05) which means that there was a significant relation between residential density with the incidence of respiratory disease among children. In other words, density proven to be a risk factor for respiratory disease with OR = 4.235 showed that children living in dense house had risk 4.235 times higher than with children living in not dense houses.[25] The transmission of URI spread quickly in the dense house because of contact with the sufferers carrying the agent of the diseases.[30]

None of the maternal behavior factors was related to URI. Hand-washing was not significantly associated with the incidence of URI (p value = 0.820; OR = 1.07 (0.55 to 2.08)). This study did not observe in hand-washing because of the time limit, also this study only used likert scale questionnaire to measure hand-washing. It was different from study on the relation between hand-washing and the risk of respiratory infections in the systematic review by searching various articles conducted prior to June 2004 as it was found that hand-washing could lower the risk of respiratory disease by 16% (95% CI 11 – 21%). However, the implications of this discovery for developing countries is not significant because the geographical limitations.[15]

The use of mask was not significantly associated with URI (p value = 0.91; OR = 0.96 (95% CI = 0.50 – 1.85)). There was no standards in measuring the use of mask and no instructions on how to use the mask properly to

prevent URI. Also, the time required to wear a mask to prevent URI was still difficult because of unknown incubation period. The use of mask sometimes must be done before the onset of disease symptoms. It will need further study to show the association between the use of mask with URI.[31,32]

Mothers' smoking behavior was not significantly associated with URI (p value = 0.097; OR = 0.424 (95% CI = 0.151 – 1.193)). Measurement of smoking behavior would be better with observations, while in this study did not observe such behavior. Mothers' smoking behavior was not significant because children were far from their mothers when the mothers were smoking.[33]

Vitamin A consumption was not significantly associated with URI (p value = 0.483; OR = 1.647 (95% CI = 0.424 – 6.396)) because of the vitamin A coverage of West Java was good as this study suspected. Coverage of infants who received vitamin A was 84.18% and the coverage of toddlers who received vitamin A was 83.85%.[13] This case needs further study regarding how important vitamin A on respiratory tract. Exclusive breastfeeding was not significantly associated with URI (p value = 0.425; OR = 0.758 (95% CI = 0.384 to 1.498)). Exclusive breastfeeding is one source to enhance the immune system of infants. When viruses and bacteria come, then the immune system will fight it. Other factors should also be considered here for URI. In addition, the amount of milk as well as the length of time given also affected the function of the children's immune system. Even though it was different with the study conducted in Aceh, but they suggested health workers to improve the health promotion programs, especially regarding exclusive breastfeeding and complementary feeding for infants with a focus on mothers and prospective mothers. The mothers are also expected to pay more attention to the age of complementary feeding for infants that are not easily infected.[34,35]

## Conclusion

In this study, household environment significantly related to URI were humidity and density. However, humidity seems to be the protective factor against URI. House humidity that does not meet the criteria does not cause URI. This is related to the frequency of childen settled at house. Toddlers often play outside the house, so the URI transmission could have come from childhood friends. Otherwise, toddlers living in houses that do not meet the criteria have 2.8 times risk of suffering from URI compared to the houses that meet the criteria. None of maternal behavior factor is related to URI. These results need further studies to observe the maternal behaviors related to URI with longer period of time. Finally, the most influential factor significantly related to URI is density. Reducing density is important and challenging issue in slum area. Consequently, increasing health promotion, healthy hygienic behavior and prevention from URI is essential to reduce the risk of this disease among toddlers in urban slum area.

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# Predisposing Factors of Complementary Feeding Practices among 9-11 Month-Old Infants in Jakarta Urban Slum Area

## Faktor-faktor Predisposisi pada Praktik Pemberian Makanan Pendamping Air Susu Ibu pada Bayi Usia 9-11 Bulan di Daerah Kumuh Perkotaan Jakarta

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**Abstract**

The main cause of the undernutrition beside the infectious diseases is inappropriate caring practice and optimum feeding becomes one of ways to overcome long-term consequences of undernutrition. This study aimed to determine correlation between predisposing factors with complementary feeding practice among 9 – 11 month-old infants in Jakarta urban slum area. This cross-sectional study included 50 sitters of 9 – 11 month-old infants on May 2012. Data was collected through interview using questionnaire. There was no significant correlation between age of the sitters with the complementary feeding practice (p value = 0.645) as well as correlation between sitters with infants (p value = 0.724), occupation of sitters (p value = 1.000) and the number of infants in a family (p value = 0.738) which showed there was no significant correlation between those three factors with complementary feeding practice. Otherwise, there was a significant correlation between education and knowledge of sitters with complementary feeding practice (p value = 0.012 and p value = 0.005).

**Keywords:** Feeding practice, infants aged 9 – 11 months old, urban slum area

**Abstrak**

Penyebab utama kekurangan gizi selain dari penyakit infeksi adalah pola asuh yang tidak sesuai dan pemberian makan yang optimal menjadi salah satu cara untuk mengatasi konsekuensi jangka panjang dari kekurangan zat gizi. Penelitian ini bertujuan untuk mengetahui hubungan antara faktor pendukung praktik pemberian makanan pendamping air susu ibu (MPASI) pada bayi usia 9 - 11 bulan di daerah kumuh perkotaan Jakarta. Penelitian potong lintang ini melibatkan 50 orang pengasuh bayi usia 9 – 11 bulan. Data dikumpulkan melalui wawancara menggunakan kuesioner. Tidak terdapat hubungan yang bermakna antara usia pengasuh dengan praktik pemberian makan (nilai p = 0,645). Demikian juga dengan hubungan antara pengasuh dengan bayi (nilai p = 0,724), pekerjaan pengasuh (nilai p = 1,000), dan jumlah bayi dalam satu keluarga (nilai p = 0,738) yang menunjukkan tidak adanya hubungan antara ketiga faktor tersebut dengan praktik pemberian makanan. Sebaliknya, terdapat hubungan yang bermakna antara pendidikan dan pengetahuan pengasuh dengan praktik pemberian makanan (nilai p = 0,012 dan nilai p = 0.005).

**Kata kunci:** Praktik pemberian makanan, bayi usia 9 – 11 bulan, daerah kumuh perkotaan

### Introduction

Undernutrition among toddlers remains a serious problem.[1-3] World Health Organization (WHO) has identified poor quality and quantity of complementary food with inappropriate feeding practices as one of the major causes of undernutrition among children and the immediate consequences of poor nutrition during two years of age including significant morbidity and mortality as well as delayed mental and motor development. Poor breastfeeding and complementary feeding practices, coupled with high rates of infectious diseases, are the principal proximate causes of malnutrition during this stage of age.[4-6]

Adequate nutrition during infancy and early childhood is fundamental to the development of each child's full human potential. It is well recognized that the period from birth to two years of age is a 'critical window' for

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the promotion of optimal growth, health and behavioral development.[7,8] Breastfeeding is enough to fulfill infants requirement until six months. However, after six months of age, breast milk itself is no longer sufficient.[9] The age period is often marked by growth faltering, micronutrient deficiencies and common childhood illnesses, such as diarrhea, as children transition from exclusive breastfeeding to solid foods in addition to breast milk.[5]

According to The United Nations Children's Fund (UNICEF), one of the main causes of the malnutrition beside the inadequate nutrition is inappropriate caring practice. The introduction of complementary food is a critical stage. A child will be at increasing risk of malnutrition and illness if such food is introduced much more before the age of six months, or if the preparation and storage of food in the house is unhygienic. For optimum development, children require emotional support and cognitive stimulation, then parents and other sitters have a crucial role in recognizing and responding to the actions and needs of infants.[10]

According Kumar et al,[11] improper feeding practice had significantly correlated with the toddlers' nutritional status (p value < 0.05). Feeding practice is influenced by education, knowledge and beliefs of the sitters.[12] Appropriate feeding practices are fundamental necessity for the survival, growth, development, health and nutrition of infants and children. Some studies on complementary feeding in Indonesia revealed that complementary feeding practices were inappropriate, complementary food was introduced too early or too late and both quality of complementary food are below recommendation.[13,14] The frequency and portion of food provided to the 6 – 23 month-old infants were less than the recommendation.[13]

Infants and children are divided into three different age groups. From the first time baby was born until six months of age, this is the period of exclusive breastfeeding which means that the baby only receives breast milk as his/her food. The next six to eight months, baby starts to be introduced to food or liquid along with the breast milk. When the baby at the age of 9 – 11 months, the consistency of food should be semi-solid food. This period is called special transitional food. After the children entering 12 months of their life, they start to recognize food like other members of family consume.[15,16]

Contribution of energy from breast milk is 413 kcal/day at aged of 6 – 8 months and will be reduced approximately by 8% into 379 kcal/day at the age of 9 – 11 months. Thus, gap of energy needs should be filled from the complementary feeding, which the complementary feeding contributes worth 269 kcal at the age of 6 – 8 months and will be increased into 451 kcal at the age of 9 – 11 months. Meanwhile, the digestive system of infants aged 9 – 11 months are still in the stage of adapting the semi-solid food and provided the limited capacity of the stomach and nutrient density of complementary food.[8,17,18]

A study conducted in Aceh, Indonesia concerning complementary feeding showed that 68.2% respondents had already provided complementary food since they were less than four months old and most of infants aged 6 – 12 months were already provided home-made complementary food (51.4%) and combination of home-made and instant ones (35.7%).[19]

Constrain to improving feeding practice can be classified as environmental (unavailability or seasonal variability of certain food, the need to work outside the house which decreases time available for food preparation and feeding, scarcity of cooking fuel or communication of misinformation by health workers about child-feeding), or attitudinal (perceptions, beliefs, and taboos related to feeding). Frequency of feeding, especially for infants from 9 to 11 months becomes an important concern once the child has become accustomed to new food and begins to need more food to supplement breastfeeding. Because most stapple food are bulky, children need to eat more frequently than the standards two to three times per day of the adult.[20]

Therefore, this study aimed to assess the correlation between predisposing factors with complementary feeding practices among 9 – 11 month-old infants in Indonesia, especially in Jakarta urban slum area.

## Method

This study was part of the bigger study titled "Complementary Feeding Practices and Nutritional Status among 9 – 11 Month-Old Infants in Jakarta Urban Slum Area". The study was divided into two main results which were concerning on the complementary feeding practices and nutritional status, whereas it was published elsewhere. This cross-sectional study was conducted in Senen District, Central Jakarta, Indonesia on May 2012. Purposive sampling was used based on inclusion and exclusion criteria. Inclusion criteria in this study were sitters of 9 – 11 month-old infants and willing to be respondents, while the exclusion were sitters of infants with special needs or other chronic diseases. From the survey, there were 50 sitters of 9 – 11 month-old infants who met the inclusion criteria.

Most interviews were conducted in integrated health care, but sometimes also in sitters' houses and in cadre's houses. Questionnaires for sitters consisted of questions on demographic data of the household including age of sitters, the correlation between sitters with infants, sitters' education, sitters' occupation, number of infants, and sitters' knowledge regarding complementary feeding. The questionnaire questioned about breastfeeding practice, complementary feeding practice, frequency of

food provided by the sitter, child's feeding practice, the type of usual and specific food eaten by children. Based on WHO guidelines for complementary feeding, this study used five indicators to assess complementary feeding practices. Other indicators were not assessed in this study because it was assessed by other studies. To assess knowledge of sitters on complementary feeding practice, this study used three questions about continued breastfeeding, complementary feeding as well as timing and consistency of food. Predisposing factors of complementary feeding practice are factors able to influence the complementary feeding practice, such as age of sitters, relation between sitters and infants, sitters' education, sitters' occupation, amount of infants, and sitters' knowledge regarding complementary feeding.

Dependent variables in this study were the predisposing factors, while the independent variable was complementary feeding practice. Food intake data already collected by 24 hour food recall were analyzed by Nutrisurvey 2004 and continued with PC Side to determine the inadequacy of the food intake. Univariate analysis was used by frequency distribution table and percentage. Bivariate analysis was conducted by chi-square statistical analysis, odds ratio (OR) with 95% CI, with p value < 0.05 to meet the requirement of chi-square analysis. If there was a cell having expected value less than five (20%), therefore, fisher exact statistical analysis would be used. Further multivariate analysis was conducted to analyze which factor highly predisposing the complementary feeding practice on 9 – 11 month-old infants.

## Results

Univariate analysis consisted of respondents' characteristics based on predisposing factors. A total number of sitters of 9 – 11 month-old infants was 50 respondents. From 50 infants, there were 32 males and 18 females with the amount of subject in the range nine months of age were 16 infants. Then for group of aged 10 months and 11 months were each 17 infants.

Table 1 showed most sitters were more than 21 years old (88%), and most of them finished their primary education (62%). Most sitters were housewives (82%) and about 58% sitters were only taking care of one under two year-old infant. Most of them had good complementary feeding practice (64%).

Based on 2010 WHO guidelines of complementary feeding practice, this study found that 29 out of 50 infants (58%) still continued to suckle, while most of those 29 infants who still continued to suckle had fulfilled the nutrient requirement of a combined group of breastfed and formula-fed infants, for instance energy intake (90%), protein intake (86%), iron intake (62%) and calcium intake (76%), except for the zinc intake (31%). Most sitters provided appropriate food consistency, which was semi-solid food for 9 – 11 month-old infants (74%). About 90% infants had adequate energy intake and more than 50% infants had appropriate meal and snack frequency with dietary diversity more than four types of food (74%). Other indicators in WHO complementary feeding guidelines were not assessed in this study. (Table 2)

Table 3 showed that there was no significant correlation between age of the sitters with the complementary feeding practice (p value = 0.645) as well as the correlation between the sitters with the infants (p value = 0.724), sitters' occupation (p value = 1.000) and the amount of infants in a family (p value = 0.738) showing that there was no significant correlation between those factors with complementary feeding practice. On the contrary, there was significant correlation between sitters' education and knowledge with complementary feeding practice (p value = 0.012 and p value = 0.005).

Based on the multivariate analysis in Table 4, it showed that sitters' education and knowledge were protective variables on complementary feeding practice (OR = 0.237 and 0.216) which means that the mother who has higher education and better knowledge tends to perform good complementary feeding practice.

## Discussion

Behavior is the totality of a person's appreciation and activity that is the result of joint or resultant between various factors, both internal and external factors. Internal factors are the characteristics of the person concerned who are given or innate, intelligence level for instance, an emotional level, gender, etc. External factors are environments, both the physical environment and social, cultural, economic, political environment, etc. Behavior are influenced by three main factors that are predisposing factors which include knowledge and people's behavior on health, tradition, and public trust on

**Table 1. Nutrient Intake compared with Indonesian's RDA and Nutrient Inadequacy**

| Variables | Category | n | % |
|---|---|---|---|
| Age of sitters | ≤ 21 years old | 6 | 12 |
| | > 21 years old | 44 | 88 |
| Relation with the infants | Mothers | 39 | 78 |
| | Alternate sitters | 11 | 22 |
| Sitters' education | ≤ Junior high school | 19 | 38 |
| | > Senior high school | 31 | 62 |
| Sitters' occupation | Housewives | 41 | 82 |
| | Working mothers | 9 | 18 |
| Amount of infants | > 1 infants | 21 | 42 |
| | 1 infant | 29 | 58 |
| Sitters' knowledge | Less | 23 | 46 |
| | Good | 27 | 54 |
| Complementary feeding practice | Less | 18 | 36 |
| | Good | 32 | 64 |

**Table 2. Feeding Practices among 9 – 11 Month-Old Infants Compared to WHO Guidelines**

| Guiding Principles | Indicator | n (%) |
|---|---|---|
| Continued breastfeeding (N = 50) | Continue frequent, on-demand breastfeeding until 2 years of age or beyond | 29 (58%) |
| Amount of complementary food needed (N = 29) | The total energy requirements of a combined group of breastfed and formula-fed infants is 701 kcal/d at 9 – 11 months of age | Energy : 26 (90%)<br>Protein: 25 (86%)<br>Iron: 18 (620%)<br>Calcium : 22 (76%)<br>Zinc : 9 (31%) |
| Food consistency (N=50) | ≥ 6 months : soft foods<br>≥ 8 months : semi-solid foods<br>≥ 12 months : solid foods | 37 (74%) |
| Dietary diversity (N=50) | Feed a variety of foods to ensure that nutrient needs are met (DDS) | 37 (74%) |
| Meal and snack frequency in a day (N=50) | Meals should be provided 2-3 times per day at 6-8 months of age and 3-4 times per day at 9-11 and 12-24 months of age | 35 (70%) |
| | Additional nutritious snacks offered 1-2 times per day | 39 (78%) |

**Table 3. Correlation Between Predisposing Factors with Complementary Feeding Practice**

| Variables | Category | Complementary Feeding Practice | | p value | OR | 95%CI |
|---|---|---|---|---|---|---|
| | | Less | Good | | | |
| Age of Sitters | ≤ 21 years old | 3 (6%) | 3 (6%) | 0.645a | 1.93 | 0.347 - 10.77 |
| | ≥ 21 years old | 15 (30%) | 29 (58%) | | | |
| Relation with the infants | Mothers | 15 (30%) | 24 (48%) | 0.724a | 1.67 | 0.38 - 7.29 |
| | Alternate sitters | 3 (6%) | 8 (16%) | | | |
| Sitters' education | ≤ Junior high school | 11 (22%) | 8 (16%) | 0.012bc | 4.71 | 1.36 - 16.29 |
| | > Senior high school | 7 (14%) | 24 (48%) | | | |
| Sitters' occupation | Housewives | 15 (30%) | 26 (52%) | 1.000a | 1.15 | 0.25 - 2.65 |
| | Working mothers | 3 (6%) | 6 (12%) | | | |
| Amount of infants | > 1 infants | 7 (14%) | 6 (28%) | 0.738b | 0.81 | 0.32 - 2.84 |
| | 1 infant | 11 (22%) | 18 (36%) | | | |
| Sitters' knowledge | Less | 13 (26%) | 10 (20%) | 0.005bc | 5.72 | 1.60 - 20.44 |
| | Good | 5 (10%) | 22 (44%) | | | |

a : fischer exact test, b : chi-square test, c : Significant (p value < 0.05)

**Table 4. Multivariate Analysis**

| Variables | Category | Complementary Feeding Practice | | p value | OR | 95%CI |
|---|---|---|---|---|---|---|
| | | Less n (%) | Good n (%) | | | |
| Sitters' education | ≤ Junior high school | 11 (22%) | 8 (16%) | 0.054 | 0.273 | 0.073-1.023 |
| | > Senior high school | 7 (14%) | 24 (48%) | | | |
| Sitters' knowledge | Less | 13 (26%) | 10 (20%) | 0.024 | 0.216 | 0.057-0.816 |
| | Good | 5 (10%) | 22 (44%) | | | |

things related to health, value system adopted by community, education, social economy level, etc; enabling factors that include facilities and infrastructures availability or health's facilities for community; reinforcing factors that include the attitude and behavior of public figures and religious leaders as well as the attitude and behavior of the health workers.[21] The predisposing factors as analyzed in this study and showed the factors having a significant correlation with complementary feeding practices were sitters' education and knowledge about the complementary food.

Feeding practices among infants at the age of 9 – 11 months can be influenced by various factors, such as sitters' education.[22] A study conducted in Kasihan Subdistrict, Bantul District, Yogyakarta showed that malnutrition among toddlers was significantly correlated with mothers' education (OR = 0.4; 95% CI = 0.19 – 0.79).[23] Based on analysis results, this result was in accordance with the previous study which stated that mother's education had a significant correlation with the complementary feeding practice behavior. Mothers who had low education had prevalence ratio 3.27 times to behave

poorly compared to those who had higher education (p value = 0.025).[24] Mothers with higher education are very likely to be followed by their understanding regarding appropriate responsive feeding on infants.[25]

Likewise, a study conducted in rural Bangladesh found that mothers' education was associated with variables that reflected more intensive care for their children. In a similar study, however, education was also associated with less adequate feeding practices, such as termination of feeding by the mother more often than by the child, a larger number of bottle feeds per day and fewer breastfed per day. The better-educated mothers are more likely to modify their responsive practices to the age of their infants than less-educated mothers do.[12] In line with study conducted in Indonesia, the result of the study mentioned that mothers with low level of education were less likely to implement appropriate complementary feeding practice.[26] Results of this study showed that only 58% of 50 mothers giving continued breastfeeding to their children, the others stopped breastfeeding with various reasons, such as mother had to work and breast milk was not coming out anymore.

Indicators of feeding practice used in this study were based on WHO guidelines of appropriate complementary feeding practices. However, unfortunately, this study only assessed some of them who gave continued breastfeeding, adequate energy intake, consistency of food, dietary diversity, minimum meal and snack frequency, and nutrient intake of the child. The age of nine months is a transitional period to introduce family food, consistency of food during this age gradually increasing from smooth or pureed, mashed or lumpy, then chopped.[27] Most children already met the energy requirement from the complementary feeding, however, low percentage of mothers who continued to breastfeed their children (58%) might have influenced the energy intake contributing to malnutrition condition among 9 – 11 month-old infants.

Knowledge is one of the important factors for feeding practice.[12] There were four indicators of sitters' knowledge of feeding practices assessed in this study including term of continued breastfeeding, term of complementary feeding, consistency of complementary food and timing of complementary feeding. Sitters had good knowledge of continued breastfeeding if they answered. Term of continued breastfeeding is continuing breastfeeding after exclusive breastfeeding period. Sitters had good knowledge of complementary feeding if they answered, food given to the six month-old infants to complement the breast milk. Moreover, based on the stage of age, at the age of six months, more children were given liquid food. At the age of nine months, more children were given semi-solid food. Then at age of 12 months, more children were given solid food.

This study found that even most sitters had high education, they did not know about the terminology of continued breastfeeding. They knew about the term and appropriate food consistency of complementary feeding, but they did not know about the appropriate time to give the complementary food to the children. Knowledge of complementary feeding practice was related to mothers' education.

From the interview, it was known that respondents' knowledge regarding the age of the infants that were able to be given food or drink other than breast milk or family food was still poor. Low general knowledge concerning on infants' food may lead to undernutrition among infants. The fact showed that mothers who still breastfed their infants assumed that breast milk could meet infants' needs until they could submit a request to feed themselves (approximately at 12 months old). After the infants were 12 months old, they should know the family food. Respondents' knowledge concerning on the consequence of early complementary feeding on infants were still poor as well. The common growth disorder problem among toddlers had strength allegedly related to many infants who were already given complementary food since one month old, even before that. Early weaning food can increase allergies and infection, then complementary feeding on infants even before three months old will increase respiratory infection risk and marginally increase eye infection risk and episodes of malaria.[27,28]

Meanwhile, Tucker and Sanjur said[12] that maternal differentiation was positively associated with children's dietary intake and anthropometric status in their study. They used 'maternal differentiation' rather than mothers' education in their analysis of correlation of child nutrition in Panama. Maternal differentiation is a composite variable that incorporates not only years of education, but also current nutritional knowledge, frequency of reading and measure of household productivity. Thus, this measure includes evidence of use and retention of information, which they feel that it is theoretically more coherent than merely using years of schooling. Meanwhile, the previous study, which is in line with this study, proved that mothers who had poor knowledge would have risk 2.9 times higher to have poor behavior on balanced diet feeding on toddlers compared to the ones with good knowledge.[29] Mothers' education affects care-giving practices, such as ability to process information, acquire skills and model behavior.[12] Mothers' education factor might contribute sitters to probe information about feeding practice more actively. In Indonesia, high education level of mothers and fathers were both associated with protective care-giving behaviors.[22]

Most sitters in the study were housewives (64%), which means that most children were taken care of by their own mothers, which might be related to good feed-

ing practices among them. A few recent studies found significant negative associations of work for earnings with child's nutritional status. In an evaluation of almost 2,000 rural mothers in India, children of mothers who worked in agricultural sector on their own farms for five to six hours per day were likely to be significantly malnourished regardless of who the alternate sitter was.[12]

## Conclusion

Predisposing factors correlated with complementary feeding are sitters' education and knowledge concerning on complementary feeding, meanwhile predisposing factors not significantly correlated are sitters' age, relation between the infants and their sitters, sitters' occupation and number of infants. Low education and inadequate knowledge of appropriate food and feeding practices are a greater predisposing factor regarding the complementary feeding practices among 9 – 11 month-old infants.

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# Residential Density, Parents' Sexual Activity and Teenage Sexual Behavior in Yogyakarta

## Kepadatan Hunian, Aktifitas Seksual Orang Tua dan Perilaku Seksual Remaja di Yogyakarta

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**Abstract**

In dense and slum areas, parents often have to share bedroom with their children, so the children have been exposed to sexual activity since early. This study aimed to determine residential density, parents' sexual activity and its effects to teenage sexual behavior in Yogyakarta. This study used cross-sectional design by interviewing 268 families that had teenagers as selected randomly in urban slum areas and rural areas on March – May 2015. Data was analyzed using chi-square test and multivariate cox-regression. Results showed that parents living in dense residence had risk two times higher to commit sexual activity which had negative effect on their children. Parents' sexual activity did not have any influence to risky sexual behavior among teenagers. Factors significantly related to risky sexual behavior among teenagers are male sex, negative attitude and influence of peers. Health agency and primary health care should improve counseling programs for teenagers and train peer counselors. Activities which have been conducted at schools should be expanded to risky areas, such as urban slum area with high density of residence.

**Keywords:** Residence density, parents' sexual activity, teenage sexual behavior

**Abstrak**

Pada daerah kumuh dan padat, orangtua sering terpaksa harus berbagi ruang tidur dengan anak-anaknya sehingga anak-anaknya sudah terpapar dengan aktivitas seksual sejak dini. Penelitian ini bertujuan mengetahui kepadatan hunian, aktivitas seksual orangtua, dan efeknya terhadap perilaku seksual remaja di Yogyakarta. Penelitian ini menggunakan desain potong lintang dengan mewawancarai 268 keluarga yang memiliki anak remaja yang dipilih secara acak di daerah kumuh perkotaan dan daerah pedesaan pada bulan Maret – Mei 2015. Analisis data dilakukan menggunakan uji kai kuadrat dan regresi-cox multivariat. Hasil penelitian ini menunjukkan bahwa orangtua yang tinggal di hunian padat memiliki risiko dua kali lebih besar untuk melakukan aktivitas seksual yang berdampak negatif bagi anaknya. Aktivitas seksual orangtua tidak berpengaruh terhadap perilaku seksual berisiko pada remaja. Faktor yang berhubungan bermakna dengan perilaku seksual berisiko pada remaja adalah jenis kelamin laki-laki, sikap negatif, dan pengaruh teman sebaya. Dinas kesehatan dan puskesmas agar terus meningkatkan program penyuluhan remaja dan melatih konselor teman sebaya. Kegiatan yang selama ini telah dilakukan di sekolah sebaiknya diperluas pada daerah berisiko seperti daerah kumuh perkotaan dengan kepadatan hunian yang tinggi.

**Kata kunci**: Kepadatan hunian, aktivitas seksual orangtua, perilaku seksual remaja

### Introduction

Development of residential environment in urban area cannot be separated from a rapid rate of population growth due to both naturally population growth factor and urbanization process. Population growth and limited land in urban area cause the increase of small tenements traded and rented to newcomers. Such small tenements then develop into dense and slum area.[1]

In Indonesia, slum residence up to the year 2000 reached 47,000 hectare. Based on data from Yogyakarta Public Works, Housing, Energy and Mineral Resources Agency in 2014, there were 400 hectare slum area in Yogyakarta. The largest slum area was in Yogyakarta City

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(278.7 hectare) then followed by Sleman District (41.4 hectare), Bantul District (27.3 hectare) and the rest were in Kulonprogo District and Gunungkidul District.[2]

Area with high residential density, crowded housing condition and no partition between rooms affect on sexuality life not only related to parents' sexual activity, but also related to their teenagers' sexual behavior. Study concerning sexual behavior of community in urban dense and slum area in Kenya recorded that narrow living condition around urban dense and slum area really limited privacy of every family member. Parents often had to share bedroom with their children, so the children had been exposed to sexual activity since early. Furthermore, exposure of parents' sexual activity at very young age may weaken children's control when adult related to their sexual behavior. Space problem may also force teenagers to go outside house and lose parents' control, so they have a risk to get involved in risky sexual behavior outside house.[3]

Teenagers' health is mostly determined by their behavior.[4] The important and complex matter related to teenage health behavior is sexuality problem that may influence teenage morbidity and mortality.[5] Several studies concerning on teenage behavior in both developing and developed countries showed that some teenagers had committed premarital sexual intercourse. Study conducted by Rahyani, *et al,*[6] concerning teenage sexual behavior in Bali showed almost 15% of respondents in early survey admitted that they were ever forced or seduced by their own partner to commit premarital sexual intercourse (data was not presented). As many as 29 respondents (4.26%) admitted that they had committed sexual intercourse with their own partner within a recent year (1.44% female teenagers and 3.19% male teenagers). Kabiru observed transition of first time sexual intercourse committed by teenagers between those living in slum area and non-slum area in which the results showed that teenagers living in slum area were two to three years younger committing sexual intercourse for the first time than those living in non-slum area.[7] Based on such case, this study aimed to determine residential density, parents' sexual activity and its effects to teenage sexual behavior in Yogyakarta.

## Method

This study was quantitative study with cross-sectional design. Population of study was parents and teenagers of urban slum area in Tegal Panggung Subdistrict and rural area in Bangunjiwo Subdistrict, Yogyakarta. Minimum sample was calculated based on formula of hypothesis test determining two proportions by using confidence interval (CI) 95% and the test power 90% as well as difference between proportions going to be tested was 15%, which needed 120 respondents per group. Inclusion criteria were 15 – 21 year-old teenagers (male or female) living with their parents. Samples were selected gradually through randomly selecting 15 neighborhood heads in every subdistrict, then collecting data of family (family heads who had 15 – 21 year-old teenagers). After that, 10 respondents in every neighborhood were selected randomly. Samples having complete data in this study were amounted to 134 families in urban slum area and 134 families in rural area.

Residential density is measured by comparing a number of people living together in a house with the house size, then categorized into two namely high residential density if less than eight meter square per resident and low residential density if every resident has space of eight meter square or more. Sexual activity of husband and wife affecting on teen development is categorized into sexual activity which has negative effects if fulfilling two of five conditions following 1) parents do not have a private room, 2) not only sleeping with husband/wife, 3) possible for other people to see at the time of sexual intercourse, 4) feeling ever seen by other people who live together in the same house at the time of sexual intercourse, or 5) ever seen by children at the time of sexual intercourse.

Teenage sexual behavior is activity committed by teenagers to fulfill sexual urge to the opposite sex through any behavior, which is divided into two categories namely high risky sexual behavior that covers lip-kissing, touching sensitive parts of body (breasts and genital), swiping or attaching genital, or sexual intercourse. Meanwhile, low risky sexual behavior covers holding hands, embracing, hugging, or short kissing (lips-cheeks, lips-foreheads, lips-lips).

This study used primary data that was interview using structured questionnaire with parents and questionnaire filled by teenagers. Questionnaire used in this study was adopted from teenage behavior questionnaire of Indonesia Demographic and Health Survey 2012 as combined with several questionnaires in other studies with the same topic. Data analysis was conducted using chi-square test and multivariate cox-regression test.

## Results

Results of study showed 47% parents had sexual activity which had negative effect for teenagers. Parents who did not have any closed private room were 31.7%, 35% not only two (husband and wife) sleeping, 14.6% possible for other people living together in the same house to see at the time of sexual intercourse, even 4.9% parents felt ever seen by other people at the time of sexual intercourse. Meanwhile, teenagers ever seeing their parents having sexual intercourse was worth 4.5%.

Based on Table 1, parents' sexual activity that had negative effect on their teenagers occurred more among

**Table 1. Distribution of Parents' Sexual Activity According to Residential Density, Domicile Area, Family Head's Age, Family Head's Work and Family Head's Education Level**

| Variable | Category Effect on Teenagers | Parents' Sexual Activity | | | | Total | PR (95% CI) | p value |
|---|---|---|---|---|---|---|---|---|
| | | Not Having Negative Effect on Teenagers | | Having Negative | | | | |
| | | N | % | N | % | | | |
| Residential density | Low residential density | 142 | 79.8 | 36 | 20.2 | 178 | 1.46 | < 0.001 |
| | High residential density | 49 | 54.4 | 41 | 45.6 | 90 | (1.19-1.79) | |
| Domicile area | Rural area | 113 | 84.3 | 21 | 15.7 | 134 | 1.41 | < 0.001 |
| | Urban slum area | 78 | 58.2 | 56 | 41.8 | 134 | (1.18-1.72) | |
| Age | Non-reproductive (> 40 years old) | 106 | 72.6 | 40 | 27.4 | 146 | 1.15 | 0.695 |
| | Productive (20 – 40 years old) | 85 | 69.7 | 37 | 30.3 | 122 | (0.68-1.96 | |
| Work | Employed | 171 | 72.5 | 65 | 27.5 | 236 | 1.15 | 0.337 |
| | Unemployed | 20 | 62.5 | 12 | 37.5 | 32 | (0.87-1.53) | |
| Education level | Middle/high (≥ senior high school) | 76 | 70.4 | 32 | 29.6 | 108 | 0.97 | 0.897 |
| | Low (≤ junior high school) | 115 | 71.9 | 45 | 28.1 | 160 | (0.83-1.14) | |

**Table 2. Results of Multiple Logistic Regression Analysis of Factors Related to Parents' Sexual Activity Having Negative Effect on Teenagers**

| Variable | B | SE | p value | PR | 95% CI |
|---|---|---|---|---|---|
| High residential density | 0.752 | 0.297 | 0.011 | 2.12 | 1.19 – 3.79 |
| Urban slum area domicile | 0.424 | 0.265 | 0.109 | 1.53 | 0.91 – 2.59 |

families living in house with high residential density, occurred more among families in urban slum area and families whose family heads were unemployed.

According to Table 2, multivariate logistic regression analysis showed variables having significant relation to parents' sexual activity which had negative effect on teenagers were high residential density and living in urban slum area. Parents living in dense house had risk two times higher to commit sexual activity which had negative effect on their teenagers. Parents living in urban slum area had risk 1.5 times higher to commit sexual activity which had negative effect on their teenagers.

Worth 75.7% teenagers ever had partners (boyfriend/girlfriend) and the youngest age of first time dating was nine years old and the oldest was 19 years old. 17.2% teenagers started dating at the age of 15 years and 13.4% at the age of 16 years. 11.6% teenagers had high risky sexual behaviors that were lip-kissing (10.4%), touching or touched sensitive parts of body (breasts, thighs, genital) (8.6%), swiping or attaching genital (4.5%) and sexual intercourse (5.2%). Worth 88.4% teenagers had low risky sexual behaviors that were holding hands (83.6%), embracing (53%), hugging (30%) to short kissing (lips-cheeks/lips-foreheads/lips-lips) (23.5%).

High risky teenage sexual behavior occurred more among teenagers living in area with high residential density, on parents' sexual activity that had negative effect, male sex, teenagers negatively affected by peers, teenagers having negative attitude to sexuality and among teenagers who were not exposed to media of information. Results of chi-square test found statistically significant relation with p value less than 0.05 (Table 3).

Results of multivariate logistic regression analysis (Table 4) showed that residential density and parents' sexual activity did not have any significant relation to risky sexual behavior among teenagers after controlled by variables on teenagers that were peers, attitude and sex. Factors which had significant relation to risky sexual behavior were any influence of peers (PR 2.6), negative attitude to sexuality (PR 2.3) and male sex (PR 4.9) that had higher risk to have risky sexual behavior.

## Discussion

Topic of this study was sensitive, therefore dishonesty of respondents, both parents and teenagers, while filling questionnaire was quite high. This study had tried to minimalize possibility of respondents' dishonesty by convincing them that questionnaire was kept confidential. Respondents did not need to write down their names, also closed envelops were provided for questionnaire already filled by respondents in order to make them convinced of its confidentiality.

Results of this study proved any influence of residential density with parents' sexual activity. Parents living in dense house had risk two times higher to commit sexual activity which had negative effect on their children than those whose residential density was low. The result of this study was in line with another study concerning relation between urban poverty and sexual behavior by using data of demographic and health survey from African five cities namely Accra (Ghana), Dar-es-Salaam (Tanzania), Harare (Zimbabwe), Kampala (Uganda) and Nairobi (Kenya). Even though risky behavior was quite various in those five cities, people living in dense and slum area showed more risky sexual behavior than people not living in dense and slum area.[3] In this study, high risky

**Table 3. Distribution of Teenage Sexual Behavior Based on Residential Density, Sex, Role of Peers, Knowledge Level, Attitude to Sexuality, Media of Information, Religiosity Level, Parents' Sexual Activity and Domicile Area**

| Variable | Category | Teenage Sexual Behavior | | | | Total | PR (95% CI) | p value |
|---|---|---|---|---|---|---|---|---|
| | | Low Risk | | High Risk | | | | |
| | | n | % | n | % | | | |
| Residential density | Low residential density | 161 | 90.4 | 17 | 9.6 | 178 | 1.07 | 0.212 |
| | High residential density | 76 | 84.4 | 14 | 15.6 | 90 | (0.96-1.18) | |
| Parents' sexual activity | Not having negative effect | 175 | 91.6 | 16 | 8.4 | 191 | 1.13 | 0.018 |
| | Having negative effect | 62 | 80.5 | 15 | 19.5 | 77 | (1.01-1.28) | |
| Sex | Female | 135 | 97.1 | 4 | 2.9 | 139 | 1.22 | <0.000 |
| | Male | 102 | 79.1 | 27 | 20.9 | 129 | (1.11-1.34) | |
| Role of peers | Not affected (positive) | 197 | 92.9 | 15 | 7.1 | 212 | 1.30 | <0.000 |
| | Affected (negative) | 40 | 71.4 | 16 | 28.6 | 56 | (1.19-1.54) | |
| Knowledge level | High knowledge | 156 | 87.6 | 22 | 12.4 | 178 | 0.97 | 0.713 |
| | Low knowledge | 81 | 90.0 | 9 | 10.0 | 90 | (0.89-1.06) | |
| Attitude to sexuality | Positive attitude | 174 | 94.6 | 10 | 5.42 | 184 | 1.26 | <0.000 |
| | Negative attitude | 63 | 75.0 | 21 | 5.0 | 84 | (1.10-1.43) | |
| Media of information | Exposed to media | 207 | 90.8 | 21 | 9.2 | 228 | 1.21 | 0.039 |
| | Not exposed to media | 30 | 75.0 | 10 | 25.0 | 40 | (1.10-1.43) | |
| Religiosity level | High religiosity | 177 | 88.1 | 24 | 11.9 | 67 | 0.98 | 0.912 |
| | Low religiosity | 60 | 89.6 | 7 | 10.4 | 201 | (0.89-1.08) | |
| Area | Rural area | 122 | 91.0 | 12 | 9.0 | 134 | 1.06 | 0.181 |
| | Urban slum area | 115 | 85.8 | 19 | 14.2 | 134 | (0.97-1.15) | |

**Table 4. Results of Multivariate Logistic Regression Analysis of Factors Related to Risky Sexual Behavior among Teenagers**

| Variable | B | SE | p value | PR | 95% CI |
|---|---|---|---|---|---|
| High residential density | 0.089 | 0.394 | 0.821 | 1.09 | 0.51- 2.37 |
| Parents' sexual activity having negative effect | 0.327 | 0.405 | 0.420 | 1.39 | 0.63-3.07 |
| Negative influence of peers | 0.980 | 0.372 | 0.008 | 2.66 | 1.28-5.52 |
| Negatif attitude to sexual behavior | 0.836 | 0.419 | 0.046 | 2.31 | 1.02-5.24 |
| Male sex | 1.596 | 0.548 | 0.004 | 4.94 | 1.69-14.45 |

teenage sexual behavior was higher in area with high residential density (15.6%) than teenagers in low residential density (9.6%).

Results of this study also proved any influence of domicile area with parents' sexual activity. Parents living in urban slum area had risk 1.5 times higher to commit sexual activity which had negative effect on their children than parents living in rural area. This finding was in line with study in African five cities stating that people living in urban area showed more risky sexual behavior than people living in rural area.[3] Then the results of study also showed that parents' sexual activity, whether having negative effect on their children or not, was not only related to their age, education and work, but such sexual activity that had negative effect on their children was more due to influence of residential density they were living in and their domicile area in urban slum area.

Dense and slum residence in urban area causes parents and children have to sleep crammed in the same space because of no room around, which makes parents' sexual activity that has negative effect on children possible to happen. Study in Kenya had noted that condition of living narrow in urban dense and slum area really limited privacy of every family member. Parents were often forced to share bedroom with children, therefore the children were already exposed to sexual activity since early. Furthermore, exposure of parents' sexual activity at the very young age may weaken children's control when adult related to their sexual behavior.[3]

Multivariate analysis in this study showed no significant relation between residential density with teenage sexual behavior, although there was a tendency that teenagers in dense residence had higher risk to commit risky sexual behavior. This result was slightly different with another study showing any significant relation, teenagers living in dense area had higher risk to commit risky sexual behavior than teenagers not living in dense area, transition of first time having sex among teenagers living in slum area was two to three years younger to commit first time having sex than teenagers living in non-slum area.[6] This difference may occur due to any difference of way and method of measurement, the low risky sexual behavior, or because some questions related to sexual behavior were considered sensitive by Javanese people, therefore dishonesty of respondents while answering may still occur.

Teenage sexual behavior is influenced more by other

factors, such as sex in which teenage males have risk five times higher to commit risky sexual behavior than teenage females. Influence of sex is very strong in determining attitude to premarital sexual intercourse in which teenage males tend to be more permissive and more able to accept premarital sexual intercourse than teenage females.[8,9] Prior study conducted by Rosdani *et al,*[10] stated that male sex behaved more permissive or opened to sexual intercourse than the female.

Peer is also an important factor in influencing the occurrence of risky sexual behavior among teenagers. Teenagers having peers committing sexual intercourse had risk 2.66 times higher to commit risky sexual behavior. This case occurred because peer group bond could replace family bond, be source of affection, sympathy and caring, sharing experience to each other and be a place for teenagers to look for autonomy and independence.[10,11]

Attitude to sexuality is another important factor influencing risky sexual behavior among teenagers. Teenagers who had permissive attitude to sexuality had risk 2.31 times higher to commit risky sexual behavior than teenagers who had positive attitude to sexuality. Attitude is predesposition factor very related to a person's behavior. Attitude is a syndrome or a set of symptoms in responding to an object.[12-15] This study is in line with study conducted in India finding that permissive attitude to sexuality was the important risk factor to do sexual activity earlier.[16] As well as study in Africa conducted to 247 student participants showing that premarital sexual behavior committed by a woman was unacceptable case. African women would get attitude, negative reaction and punishment if they did not maintain their virginity.[17]

Role of mass media is one of factors influencing risky sexual behavior among teenagers. Teenagers not exposed to media of information properly concerning sexuality had higher risk to commit risky sexual behavior than teenagers exposed to media of information properly concerning sexuality, although not significant in multivariate analysis. According to psychologist, sex education is mostly received from mass media worth 58.8%, however, most mass media provide improper information concerning sex education. This statement of psychologist was proven by researcher from North Caroline stating that teenagers who mostly got sexual urge from media tend to commit sexual intercourse at the age of 14 to 16 years 2.2 times higher than other teenagers less seeing sex exploitation from media.[18-20]

Results of this study also showed that knowledge variable did not relate to risky sexual behavior among teenagers. This may occur because teenagers who felt they knew enough precisely dared to commit risky sexual behavior. Another possibility was that knowledge of teenagers in this study only 'know it', their understanding of sexuality in more detailed was not deeply asked. So that, although their knowledge concerning sexuality looked quite good, teenagers kept committing risky behavior.

Although there was a tendency in which parents' sexual activity that had negative effect had higher risk of risky sexual behavior among their teenagers, but it was statistically not significant. This finding is in line with conveyed by another researcher stating that a person's sexual behavior was not related to his/her parents or family, but more related to behavior nor sayings of parents that became the real model for children. In this case, the most powerful environment is nuclear family. Future of children whether failed or not is also influenced by family.[21]

Religiosity level was also a variable not related to teenage sexual behavior in this study. This may occur because questions of religiosity in questionnaire was very normative, so such questions were generally answered 'good' by most respondents. Interview questionnaire in this study could not see respondents' religiosity in daily practice. A person's religiosity only could be seen through observation of his/her ability in understanding, living up and implementing norms of his/her religion through attitude and behavior of his/her daily life.

Domicile area was also the factor not related to teenage sexual behavior in multivariate analysis. This proved that high risky sexual behavior among teenagers was not caused by difference of domicile (urban – rural), but exposure of peers and negative attitude of teenagers themselves. The result of this study was slightly different with another study which found any difference of sexual behavior between people living in slum area and people living in non-slum area in Nairobi City. Results of the study in Nairobi showed that people in slum area started to commit sexual intercourse at the earlier age had more sexual partners and be less active to determine or take preventive ways from HIV/AIDS transmission.[6,22]

## Conclusion

There is a relation between residential density and sexual activity. Parents living in dense house have risk two times higher to commit sexual activity that has negative effect on their teenagers. Parents living in urban slum area have risk 1.5 times higher to commit sexual activity that has negative effect for their teenagers. There is a tendency among teenagers who live in dense house or urban slum area having bigger risk to have risky sexual behavior, but it is statistically not significant. Factors having significant relation with the high risky teenage sexual behavior are male sex, negative attitude to sexual behavior and negative influence from peers.

## Recommendation

For health agency and primary health care around such area, counseling programs for teenagers and training peer group counselors which along this time are only implemented in schools should also be implemented in risky regions, such as urban area, especially high residential density. Government, village/subdistrict and non-governmental organization (NGO) should more apply establishment, activation and development of any teenagers' association existing in community.

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# Effects of Mothers' Attitude as Farmer and Distance of Stockyard toward Diarrhea Incidence among Toddlers

## Efek Sikap Ibu sebagai Peternak dan Jarak Kandang terhadap Kejadian Diare pada Anak Bawah Lima Tahun

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**Abstract**

Diarrhea is a disease with change of feces form and concentration in which feces is mushy to liquid, and the increase of poop frequency more than usual (three times or more in a day). In Aceh Province, there were diarrhea cases as many as 48/1,000 live births. In West Aceh District, there were 1,071 cases in 2014, meanwhile there were 70 cases among toddlers in Meureubo Subdistrict. This study aimed to determine relation between mothers' attitude as farmer and distance of stockyard toward diarrhea incidence among toddlers in work scope of Meureubo District Primary Health Care. This study was cross-sectional as conducted on July – September 2015. Samples were 70 mothers who had toddlers suffering from diarrhea symptoms. Data analysis used univariate, bivariate and multivariate. Chi-square test showed that mothers' attitude as farmer and the distance of stockyard were related to diarrhea incidence among toddlers (p value < 0.05), meanwhile multivariate test showed mothers' attitude as farmer and the distance of stockyard had no significant relation (p value > 0.05). Diarrhea incidence among toddlers is related to mothers' attitude as farmer and the distance of stockyard, but the relation is insignificant.

**Keywords:** Diarrhea, mothers' attitude, stockyard, toddlers

**Abstrak**

Diare merupakan penyakit dengan perubahan bentuk dan konsentrasi tinja yang melembek sampai mencair, dan bertambahnya frekuensi buang air besar lebih dari biasanya (tiga kali atau lebih dalam sehari). Di Provinsi Aceh, terdapat kasus diare sebanyak 48/1.000 kelahiran hidup pada 2013. Di Kabupaten Aceh Barat, pada tahun 2014 terdapat 1.071 kasus, sedangkan di Kecamatan Meureubo terdapat sebanyak 70 kasus pada anak bawah lima tahun (balita). Penelitian ini bertujuan untuk mengetahui hubungan sikap ibu sebagai peternak dan jarak kandang ternak terhadap kejadian diare pada balita di wilayah kerja Puskesmas Kecamatan Meureubo. Penelitian ini dilakukan secara potong lintang pada bulan Juli – September 2015. Sampel sebanyak 70 ibu yang memiliki balita dengan gejala diare. Analisis data menggunakan univariat, bivariat dan multivariat. Uji kai kuadrat menunjukkan bahwa sikap ibu sebagai peternak dan jarak kandang ternak berhubungan dengan kejadian diare pada balita (nilai p < 0,05), sedangkan uji multivariat menunjukkan sikap ibu sebagai peternak dan jarak kandang ternak tidak terdapat hubungan yang kuat (nilai p > 0,05). Kejadian diare pada balita berhubungan dengan sikap ibu sebagai peternak dan jarak kandang ternak, namun hubungannya tidak kuat.

**Kata kunci:** Diare, sikap ibu, kandang ternak, anak bawah lima tahun

### Introduction

One of main causes of toddler mortality in developing countries is diarrhea incidence. It is estimated that two billion in every year, numbers of diarrhea incidence occurred in Africa and South Asia. This disease globally may cause toddler mortality as many as 1.6 million.[1] Number of toddler mortality caused by diarrhea in Aceh Province in 2011 was 62/1,000 live births, then it decreased to 52/1,000 live births in 2012 and decreased more to 48/1,000 live births in 2013.[2] Even though diarrhea incidence was decreasing, death of toddlers caused by diarrhea need to be anticipated because diarrhea is very potential to be extraordinary incidence.[3]

Data obtained showed that diarrhea cases among toddlers in West Aceh District was still quite high, although

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there was a decrease every year in 2012, 2013, 2014 as many as 1,455, 1,244 and 1,071 diarrhea cases among toddlers respectively. For the area of Meureubo Subdistrict, the amount of toddlers suffering from diarrhea was 212 cases in 2012 and 171 cases in 2013, meanwhile the amount decreased more to 70 cases in 2014.[4]

The transmission of diarrhea caused by pathogenic bacteria was fecal-oral. Diarrhea is one of digestive system infection diseases due to effects of water and food contamination by bacteria or microbes.[5] Classification of diarrhea based on dehydration level can be grouped into three groups namely mild diarrhea (acute diarrhea), moderate diarrhea and severe diarrhea.[6] Risk factors of this disease distribution are unqualified feces disposal and bad hand-washing process after poop and in contact with feces before producing food.[7] Other risk factors are unhygienic food, inadequate cool food storage, food contact with house flies and consumption of contaminated water.[7] The low mothers' positive attitude to household environment hygiene is also one of risk factors of diarrhea incidence among toddlers as this might be caused by the low mothers' education level.[8] The higher level of mothers' education, the wider mothers' knowledge, so that will affect on mothers' attitude in daily activities which may determine toddlers' health.[8]

One of risk factors of diarrhea incidence is due to misuderstanding or attitude of mothers to personal hygiene, both related to mothers' hygiene and toddlers and hygiene of environment around households.[9] One of vectors causing diarrhea is the existence of house flies. House flies are often considered as disease carrier animal, such as diarrhea incidence among people, especially among toddlers.[10] It is proven that house flies carry pathogenic bacteria from unhygienic environment and move the pathegonic bacteria from one place to another place, such as from waste disposal, feces disposal and stockyard. House flies are able to move disease bacteria into food which will be eaten by human from waste disposal, feces disposal, nor stockyard.[11]

One of environment-based diseases is diarrhea. Hygienic water media and feces disposal are some of most dominant factors.[12] Human's behavior will interact together with these two factors. If environment factor is unhealthy due to contamination of diarrhea-causing bacteria and accumulation with unhealthy human's behavior, it may cause diarrhea incidence.[13]

Mothers who have a good knowledge will perform a good attitude, so this may determine the track of toddler's health status such as diarrhea prevention by maintaining hygiene, therefore bacterial contamination both in food and beverage consumed can be avoided.[14] Mothers' hygiene habit such as washing hands before eating will protect toddlers from bacteria attached in mothers' hands before.[15]

Inproper disposing of manure becomes one of factors causing the worse quality of environment and will affect the occurrence of family health disorders, especially among toddlers.[16] Stockyard which is near the house (< 10 meter) may trigger the increase of house fly population due to manure around the house environment or the stockyard that is potential to be a house fly-breeding place, so this condition will become one of causes of the occurrence of public health disorders, especially among toddlers.[17]

Generally, risk factors of diarrhea incidence is environment factor (the availability of clean water, family's latrine, waste disposal, wastewater disposal, droppings because of stockyard distance near the residence), healthy and hygienic lifestyle, body immune, alimentary canal infection, allergy, malabsorption and poisoning.[18] Beside intrinsic and extrinsic factors, causes of diarrhea incidence among toddlers are also influenced by the attitude of toddlers' mothers or sitters. This matter is due to toddlers who are still not yet able to protect themselves and very dependent on their environment. If mothers or sitters of toddlers cannot do care of the toddlers well and healthy, therefore, diarrhea incidence among toddlers will be easy to occur.[19,20] This study aimed to determine relation between mothers' attitude as farmer and the distance of stockyard toward diarrhea incidence among toddlers.

## Method

This study used secondary data (primary health care's records) in 2014, further data would also be collected through interview and observation. Type of study was analytical survey with cross-sectional approach. Population in this study was all mothers who had toddlers with diarrhea symptoms diagnosis that came for medical treatment to Meureubo Subdistrict Primary Health Care, West Aceh District. Samples of study used total of sample (if amount of population was less than 100, thus population could be taken as samples of study).[21] Therefore, samples in this study were taken using total of samples as many as 70 mothers who had toddlers suffering from diarrhea symptoms that came to primary health care.

Inclusion criterion in this study was mothers who had toddlers (0 – 5 years old) with diarrhea symptoms diagnosis that came for medical treatment to Meureubo Subdistrict Primary Health Care in 2014. Exclusion criteria were mothers who did not have toddlers with diarrhea diagnosis and mothers who had toddlers with diarrhea diagnosis that were not willing to be interviewed. This study was conducted on July – September 2015. Instruments used in this study were questionnaire, check list, camera and roll meter.

Based on data collection and processing, a good atti-

tude of mothers were those who correctly answered questions of questionnaire ≥ 50% from questions proposed, otherwise a bad attitude of mothers were those who correctly answered questions of questionnaire ≤ 50% from questions proposed. Proper distance of stockyard was if ≥ 10 meter from the house, meanwhile inproper distance of stockyard was ≤ 10 meter from the house.

Variable analyzed was mothers' attitude as farmer and the distance of stockyard. Data analysis used in this study was univariate analysis to give any depiction of variable observed and bivariate analysis (chi-square) was conducted to determine variable candidate of multivariate model with provisions that were independent variables had p value < 0.05, then included into logistic regression model, determination of the best model considered with p value < 0.05 by using enter method (the researcher eliminated unqualified variables) as reference in making decision of test results. Multivariate analysis was used to determine the nature of predictor variables and their relative contribution in explaining dependent variable (diarrhea incidence). In this study, dependent variable was dichotomous. Therefore, analysis used was logistic regression to predict relations between dependent variable and independent variable.

## Results

Based on data in Table 1, there could be seen that type moderate diarrhea showed the highest percentage (61.4%), meanwhile diarrhea incidence among toddlers with type mild diarrhea showed the lowest percentage (38.6%). Results of study showed that the highest diarrhea incidence among toddlers occurred among females (62.86%), meanwhile the incidence among males was shown by percentage 37.14%. In Table 1, the highest diarrhea among toddlers based on age group was <2 years old (31.43%), meanwhile the lowest age group was ≥ 4 - 5 years old (18.57%).

Data in Table 2 presented that hygiene condition of household environment among mothers who had a job as farmer, especially with the distance of stockyard less than 10 meter from their houses, showed a quite high number (74.29%). Likewise in household waste management, respondents throwing the waste arbitrarily was 52.86%. Based on Table 2, condition of manure was scattered (51.43%), meanwhile condition of house and environment was bad maintained (41.43%). Then management of household liquid wastewater thrown arbitrarily was shown by the percentage 34%.

According to Table 3, there was a significant relation (p value < 0.05) between mothers' attitude and diarrhea incidence among toddlers. Moreover, the risk value (odds ratio/OR) on mothers' attitude was 3.22 (95% CI: 1.176 – 8.867). This means that mothers' attitude had opportunity for three times to determine diarrhea incidence among toddlers. Table 3 also showed there was a relation between the distance of stockyard and diarrhea incidence among toddlers (p value < 0.05) with OR on mothers' attitude 3.53 (95% CI : 1.159 – 10.790). This means that stockyard distance had opportunity for three times to determine diarrhea incidence among toddlers.

Results of statistical test on mothers' attitude and the distance of stockyard toward hygiene of household environment with diarrhea among toddlers could be seen in Table 4. Based on Table 4, mothers' attitude from the result of logistic regression test with p value > 0.05 (95% CI: 0.424 – 17.988) showed no significant relation was

**Table 1. Distribution of Toddlers Attacked by Diarrhea**

| Criteria | Variable | Total | % |
|---|---|---|---|
| Types of diarrhea (based on dehydration level) | Moderate | 43 | 61.4 |
| | Mild | 27 | 38.6 |
| Sex | Male | 26 | 37.14 |
| | Female | 44 | 62.86 |
| Age | < 2 years old | 22 | 31.43 |
| | ≥ 2 - < 3 years old | 19 | 27.14 |
| | ≥ 3 - < 4 years old | 16 | 22.86 |
| | ≥ 4 - 5 years old | 13 | 18.57 |

**Table 2. Distribution of Mothers as Farmer Based on Hygiene of Household Environment**

| Criteria | Variabel | Result | % |
|---|---|---|---|
| Management of household liquid wastewater | Thrown arbitrarily | 24 | 34 |
| | Left puddled | 22 | 31.42 |
| | Thrown to ditch | 11 | 15.71 |
| | Channeled to septic tank | 13 | 18.57 |
| Management of household waste | Burned | 33 | 47.14 |
| | Thrown arbitrarily | 37 | 52.86 |
| Practice of hygienic and healthy lifestyle | Scattered waste | 34 | 48.57 |
| | Scattered manure | 36 | 51.43 |
| Distance of stockyard | ≥ 10 meter | 18 | 25.71 |
| | < 10 meter | 52 | 74.29 |
| Condition of house and environment | Good | 20 | 28.57 |
| | Quite good | 21 | 30.0 |
| | Bad | 29 | 41.43 |

**Table 3. Relation between Mothers' Attitude as Farmer and Distance of Stockyard toward Diarrhea Incidence among Toddlers**

| Variable | Category | p value | OR | 95%CI |
|---|---|---|---|---|
| Mothers' attitude | Good<br>Bad | 0.03 | 3.22 | 1.176 – 8.867 |
| Stockyard | ≥ 10 meter<br>< 10 meter | 0.023 | 3.53 | 1.159– 10.790 |

**Table 4. Relation between Mothers' Attitude as Farmer and Distance of Stockyard toward Diarrhea Incidence among Toddlers**

| Variable | Category | p value | 95% CI |
|---|---|---|---|
| Mothers' attitude | Good<br>Bad | 0.288 | 0.424 – 17.988 |
| Distance of stockyard | ≥ 10 meter<br>< 10 meter | 0.68 | 0.904 – 17.621 |

found between mothers' attitude as farmer toward hygiene of household environment and diarrhea incidence among toddlers.

Based on Table 4, the distance of stockyard from logistic regression test showed p value > 0.05 (95% CI: 0.904 – 17.621) as this means there was no significant relation between the distance of stockyard toward hygiene of household environment and diarrhea incidence among toddlers.

**Discussion**

Mothers' attitude as farmer is mothers' perception towards hygiene of household environment that needs to be concerned on, even though logistic regression test results showed mothers' attitude toward hygiene of household environment in relation to diarrhea incidence among toddlers did not give significant contribution. If based on Table 2, this might be caused by mothers' attitude to hygiene of household environment was considered still unhealthy, then management of household liquid wastewater left puddled (31.42%), management of household waste thrown arbitrarily (52.86%), practice of hygienic and healthy lifestyle was still unhygienic seen through scattered manure (51.43%), the distance of stockyard to the house less than 10 meter (72.49%), also condition of house environment was still considered unhygienic with bad condition of house (41.43%).

Mothers who had bad hygiene of household environment would lead toddlers to have quite high risk of suffering from diarrhea symptoms. This might be caused by house flies as vector carrying disease bacteria, especially bacteria causing diarrhea among toddlers, are living and breeding in humid and odor places. House flies are often found in opened trash (inproper disposal of household liquid wastewater), manure scattered around the house environment would make house flies to survive and breed. This matter is also proven by chi-square statistical test results showing any relation between mothers' attitude to hygiene of household environment and diarrhea incidence among toddlers (p value < 0.05).

Results of study also showed that diarrhea incidence was closely related to mothers' attitude. If mothers' attitude was good, toddlers' health would also be good. One of mothers' attitude examples is level of mothers' confidence to hand-washing before eating.[10] This result of study was in accordance with another study stating there was any significant relation between mothers' attitude and diarrhea among toddlers.[19] Attitude is a predisposing factor in someone's behavior. There are any relation and appropriation of attitude with someone's behavior.[22] According to Lawrence Green theory, someone's behavior is influenced by knowledge, attitude and belief.[23]

Attitude is perspective or feeling as well as tendency to act in appropriate with attitude to particular object. Thus, mothers' negative attitude to healthy lifestyle, it probably will cause occurrence of diarrhea suffer.[24] The establishment of attitude is influenced by personal experience, culture, other people who are considered important, mass media, institution of education itself and religious institution as well as emotional factor within individual. Therefore, improving mothers' positive attitude to hygiene of household environment and hygienic and healthy lifestyle can be through approaches to public figures, religious organizations (religious study activity, religious group's activities).[25,12]

This approach to public figures needs to be performed because it could become a role model for people and any figure's decision is the way for the succeed of diarrhea disease prevention program. It is hoped that after this approach is implemented, people are easier to understand the aim of counseling and mothers realize to have positive attitude to healthy lifestyle, both in washing hands with soap and the maintenance of clean water and healthy latrine facilities.[15,26]

Based on logistic regression test (Table 4), the distance of stockyard toward hygiene of household environment did not give significant contribution to diarrhea incidence among toddlers, however, this needs to be concerned on because according to the result of chi-square test, there was a significant relation (p < 0.05) between the distance of stockyard toward hygiene of household environment and diarrhea incidence among toddlers. Transmission of bacteria causing diarrhea may occur through disease vectors, such as animals and insects upon manure or human feces, then they touched food. Moreover, the cause of diarrhea may also be influenced by the bad hygiene of environment due to stockyard near the house.[27]

Food infected by house flies as contaminated by microorganisms like bacteria are then carried and ejected from the house fly's mouth and eaten by human, therefore, it causes diarrhea disease among people, especially toddlers. House flies are very closely related to waste. If the waste is bad managed, it will invite house flies to come, so it enlarges risk to contact with people. This case will affect the occurrence of health disorders such as diarrhea among toddlers.[28,29]

There was a relation between the distance of stockyard and diarrhea incidence because the closer the stockyard to the house, the higher possibility for house flies as vector carrying disease to contaminate food.[25] House flies very like dirty and odor places. This is related to the existence of manure around the stockyard near to the house.[29]

The existence of stockyard less than 10 meter will become one of risk factors that may invite house flies.[17]

House flies have an important role in the spread of diseases because they can transmit 100 types of pathogenic bacteria that may cause any diseases among humans.[30] Pathogenic bacteria causing diseases used to be carried by house flies from any sources, such as the remaining dirt, trash and other dirt sources, then pathogenic bacteria attached to the mouth and other body parts are moved to human's food.[31] The similar study also mentioned any significant relation between the distance of stockyard and diarrhea incidence among toddlers. The distance of stockyard should be built at a distance of 10 meter measured from each edge of stockyard's roof. Isolation and quarantine stockyard from any cage or other buildings is measured at a distance of 25 meter or at least 10 meter with 2 meter height of wall.[32] There was a relation between the distance of stockyard toward hygiene of household environment and diarrhea incidence because the closer the stockyard to the house, the higher possibility for house flies as vector carrying disease to contaminate food.[33]

Based on results of multivariate test, mothers' attitude as farmer and the distance of stockyard showed no significant relation to diarrhea incidence among toddlers. However, mothers' attitude as farmer and the distance of stockyard should be concerned on because statistically, according to chi-square test, it showed any relation (p value < 0.05) between mothers' attitude as farmer and the distance of stockyard toward hygiene of household environment with diarrhea incidence among toddlers.

## Conclusion

Diarrhea incidence among toddlers is related to mothers' attitude as farmer and the distance of stockyard, but the relation is insignificant.

## Recommendation

It is hoped that study with more variables can be conducted to determine how the relation between stock types and stockyard toward density level of house flies with diarrhea incidence.

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