

## MOTHER'S CHILD FEEDING KNOWLEDGE AND PRACTICES ASSOCIATED WITH UNDERWEIGHT IN CHILDREN UNDER-FIVE YEARS: A STUDY FROM RURAL KONAWE, INDONESIA

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### ABSTRACT

**Background:** Many rural mothers did not give appropriate child feeding which impacted to underweight for their children in Konawe District of Southeast Island in Indonesia. This was also related to mother's poor knowledge about child feeding. Objective: this study aimed to investigate the relationship between rural mothers' knowledge and their practices of child feeding with underweight in under-5 children in Konawe District, Southeast Sulawesi Province in Indonesia.

**Methods:** The case-control study was conducted in 5 rural areas in Konawe District, Southeast Sulawesi Province. The study involved 400 under five children and their mothers, including 100 of whom were cases and 300 of whom were age-matched controls (1:3). Cases were underweight children, while the controls were children with a normal nutritional status. The independent variables were mother's knowledge and their child feeding practices. The data analysis used Conditional Logistic regression.

**Results:** poor mothers' knowledge (odds ratio [OR], 8.9; 95% confidence interval [CI], 4.0 to 19.6;  $p < 0.001$ ), poor practices of under-5 children feeding (OR, 15.2; 95% CI, 5.5-41.7;  $p < 0.001$ ) significantly associated with underweight in rural children.

**Conclusion:** Mothers' knowledge about the availability of nutritious foods determines her child feeding practices. A mother's level of knowledge about nutritious foods and her practices is related to her educational level and health information sources.

**Key words:** Child, Feeding Behaviour, Knowledge, Mother, Practice, Underweight

## INTRODUCTION

Konawe district was one of districts in Southeast Sulawesi Province, Indonesia which had a high prevalence of severely underweight children under five years of age (under-five). In 2011, the prevalence of severely underweight children in this district was 2.35% compared to other districts such as North Konawe (1.07%), Kolaka (1.13%), Kendari

city (1.57%), Bombana (2.18%) and Muna (2.34%) ([Health Department of South East Sulawesi Province, 2011](#)). The causes of severely underweight children under-five in this district have not been explained clearly. Childhood malnutrition is a major global public health challenge resulting in a substantial increase in mortality and an overall

disease burden ([Bundara, Mwanri, & Masika, 2013](#)). It is also well documented that childhood malnutrition is associated with decreased productivity resulting in a vicious cycle of poverty in affected families, communities and nations ([Bloom, Canning, & Jamison, 2004](#); [Martorell, 1999](#)).

Several studies suggested that an underweight child is resulted by interrelated factors where adequate food intake and child's health status are immediate factors ([Smith & Haddad, 2000](#)). A study in developing countries pointed out that the role of a mother is very important to child's nutritious food intakes and their health status rather than a father. Thus, mother's time, skill, knowledge and her health status influence to child's nutritional status ([Mosley & Chen, 1984](#)). For example, fewer mothers' visiting to community health care services during pregnancy and after delivery will influence to her health and child's health status as well as they will have less health information because health care services provide comprehensive package of health services for mothers and children ([Mosley & Chen, 1984](#)). Mother's knowledge especially about under-five child nutritious food is important determinant to do appropriate child feeding practices ([M.T Ruel, Habicht, Pinstруп-Andersen, & Grohn, 1992](#); [Webb & Blok, 2003](#)). However, these factors have not been yet linked clearly as determinants to a higher prevalence of underweight in under-5 children in Konawe district. Do mother's child feeding knowledge and practices contribute to underweight in children under-five in rural villages in Konawe District?. To address that issues, so this study aims to investigate the relationship between the mother's knowledge and her practices about child feeding and underweight in children under-five in Konawe district.

## METHODS

### Study Design

This study used a case-control design. Participants were drawn from five selected community health centers in Konawe district,

Indonesia. A case was defined as an underweight child aged 0-59 months, indicated by a Z-score of weigh-for-age of below -2 as being moderately underweight and a Z-score of weight-for-age below -3 as being severely underweight ([CDC & WFP, 2005](#)). In contrast, a control was defined as a child aged 0-59 months, indicated by a Z-score of weight-for-age of below +2 and above -2 standards deviation ([CDC & WFP, 2005](#)).

The independent variables were mothers' knowledge about child feeding and her child feeding practices. Data about the mothers' knowledge and practices of child feeding were assessed using the WHO's principles for complementary feeding of breastfed and non-breastfed children aged 6 – 24 months ([World Health Organization, 2005, 2008, 2010](#)). For the knowledge level in relation to child feeding, seven questions in the questionnaire were assessed. While, the assessment of child's feeding practices was divided into two groups based on a child's age as either 1-5 months or 6-59 months. Each question was scored based on the number of right answers made available in the questionnaire. The right answer was given a score of '1' and a wrong or no answer was given a score of '0'. The percentage of the correct knowledge and practice was calculated by dividing the total correct knowledge or practices by the total number of scores and multiplying by 100%. Thus, the final assessment was divided into percentiles. The lower level was given for mothers when the total scores of their correct answers were below 33.3%. Mothers with the medium level of child feeding knowledge and practice were when the total scores of both knowledge and practices between 33.3% and 66.7%. Mothers with the higher knowledge and practices related to child feeding were when their total correct answer was above 66.7%.

### Population and Sample of this Study

The population was all under-5 children in 5 villages in Konawe District. The sample was 400 under-5 children. They were recruited from the register of the childhood nutritional program in the 5 health care centres. The sample size was calculated using the Kelsey et

al (Kelsey, Thompson, & Evans, 1986, p. 122-125) model of sample size calculation for case-control studies at a case to control ratio of 1:3. A 2-sided significance level used 0.05, 80% power and 95% confidence intervals (CI). Cases less than 11 months old were matched with a control of the same age, while cases aged 12-59 months were matched with controls of a similar age. In each of the 5 health care centres, 20 cases were identified, and these were then matched with 60 controls from the same health care centre. The children's mothers or guardians were also invited to participate in structured interviews in the form of a questionnaire.

### Ethical approval

This study was approved by the Social and Behavioural Research Ethics Committee in Flinders University, South Australia (Project number 5863) on 6<sup>th</sup> November 2012. The study was also approved by the Research and Development Agency of South East Sulawesi Province, Indonesia on 22<sup>nd</sup> October 2012 (a letter number 070/2219/X/Balitbang/2012).

### Data Analyses

Data was analysed using both univariate and multivariate analyses. The analyses were undertaken using a Conditional Logistic Regression in SPSS version 20.0 (IBM, 2012). The regression coefficients were expressed as odds ratios and these were considered statistically significant if their 95% confidence interval did not include unity. The more the

odds ratio deviated from 1, the stronger the association between the exposure variable and the condition being studied. A p-value of <0.05 suggested of significant association. The reference category of all models used a category assumed to have the least risk. For example, the reference category of knowledge and practices were higher percentile (above 66.7%).

## RESULTS

### Characteristics of children and the mothers in the case and control groups

In the total sample, there were 217 male children and 183 female children. The distribution of male and female children under-five was almost equal in the cases and the controls (Table 1). Nearly half of the mothers in both cases (45%) and controls (52.7%) were between 20-29 years of age (Table 1). There were a small proportion of mothers in both cases and controls groups whose ages were under 20 years and over 50 years of age. Mothers in the control group were about one year younger than the mothers in the cases group. The proportion of mothers with lower levels of education ( $\leq$  primary school) was higher in cases (37.4%) compared to controls (21%) (Table 1). Also, mothers in cases (54%) compared to controls (30%) were found a low family income (less than Rp 1,200,000/month or US\$ 122) (Table 1).

**Table 1** Descriptive information of children's and mother's characteristics

		Cases (n = 100)		Controls (n = 300)	
		No.*	%	No.*	%
<b>Children’s characteristics:</b>					
Sex:	Male	55	55.0	162	54.0
	Female	45	45.0	138	46.0
Mean age (± 1 SD †)		29.5 ± 13.2		26.8 ± 14.4	
<b>Mother’s characteristics:</b>					
Mean age (± 1 SD †)		30.2 ± 7.6		29.0 ± 6.4	
<b>Mother’s education:</b>					
	Senior high/Diploma/Post graduate	25	25.3	146	48.7
	Junior high	37	37.4	91	30.3
	Primary/No complete of primary	37	37.4	63	21.0
<b>Monthly family income:</b>					
	High (>Rp 1,500,000 or US\$ 153)?	31	31.0	97	32.3

	Cases (n = 100)		Controls (n = 300)	
	No.*	%	No.*	%
Medium (Rp 1,200,000 to Rp 1,500,000)	15	15.0	113	37.7
Low (< Rp 1,200,000 or US\$ 122)	54	54.0	90	30.0

No\* Number of cases and controls exposed

? Exchange rate US\$ 1 = Rp 9,828 (12 June 2013)

SD† Standard Deviation

### Mothers' knowledge about child's nutritious foods

In general, the mothers of cases had a lower knowledge (<33.3%) about nutritious food for children than the mothers of controls (Table 2). As displayed in Table 2, the proportion of mothers with a lower knowledge (<33.3%) about the benefits of healthy foods for children was higher in cases (60%) when compared to controls (41.3%). On the other hand, the proportion of mothers with medium levels of knowledge (between 33.3% and 66.7%) was lower in cases (40%) when compared to controls (53.7%). There were no mothers in cases with a higher knowledge (>66.7%), whereas in controls 5% of mothers had a higher knowledge about the benefits of healthy foods.

Furthermore, a lower proportion of mothers in the case group (89%) provided correct answers about the appropriate foods for children less than six months of age as compared to 98% of mothers in the control group. Likewise, a higher proportion of mothers in cases (11%) compared to controls (2%) could not answer questions about the appropriate foods for 0-5 month old babies. In terms of knowledge about foods for 6-8 month old children, there were 29% of mothers in cases had a lower knowledge compared to controls (5.3%). A lower proportion of mothers with a medium knowledge (between 33.3% and 66.7%) of appropriate foods for 6-8 month old babies were observed in cases (68%) compared to the mothers in controls (84.7%). A small proportion of mothers with a high knowledge of appropriate food for babies 6-8 months of the age were observed in both groups (3% in

cases vs. 10% in controls).

The proportion of mothers with a low knowledge about appropriate food sources for child feeding in cases (42%) was higher when compared with controls (17.3%). There was a significant difference in the proportion of mothers with a medium knowledge of food sources suitable for children between cases and controls. A higher proportion was observed in controls (78.3%) than in cases (57%). A small proportion of mothers with a higher knowledge of suitable food sources for children were also observed in both cases (1%) and controls (4.3%).

There were a higher proportion of mothers with a low knowledge about the benefits of breastfeeding for children under-five in cases (93%) compared to controls (71.3%). In contrast, the proportion of mothers with a medium knowledge of the benefits of breastfeeding for children under-five was lower in cases (7%) than in controls (28%).

Similarly, the proportion of mothers with a low knowledge about the benefits of breastfeeding for the mother's health was higher in cases (98%) than in controls (96.7%). The proportion of mothers with a medium knowledge of the benefits of breastfeeding for mother's health was lower in cases (2%) than in controls (3%).

Interestingly, in the cases group, there were no mothers with a higher knowledge of the benefits of breast feeding for their own health, as well as for the children under the age of five, when compared to the control group.

**Table 2** The Mothers' knowledge about nutritious food for children

Knowledge (% Right Answers)	Cases (n=100)		Controls (n=300)		Total (n=400)	
	No*	%	No	%	No	%
Benefits of healthy foods:						
Low	60	60.0	124	41.3	184	46.0
Medium	40	40.0	161	53.7	201	50.2
High	0	0.0	15	5.0	15	3.8
Foods for 0-5 month olds:						
No answer	11	11.0	6	2.0	17	4.2
Right answer	89	89.0	294	98.0	383	95.8
Foods for 6-8 month olds:						
Low	29	29.0	16	5.3	45	11.2
Medium	68	68.0	254	84.7	322	80.5
High	3	3.0	30	10.0	33	8.2
Food sources of child feeding:						
Low	42	42.0	52	17.3	94	23.5
Medium	57	57.0	235	78.3	292	73.0
High	1	1.0	13	4.3	14	3.5
Benefits of breastfeeding for children:						
Low	93	93.0	214	71.3	307	76.8
Medium	7	7.0	84	28.0	91	22.8
High	0	0.0	2	0.7	2	0.5
Benefits of breastfeeding for mother's health:						
Low	98	98.0	290	96.7	388	97.0
Medium	2	2.0	9	3.0	11	2.8
High	0	0.0	1	0.3	1	0.2

No\*: Number

**Mothers' practices of child feeding**

The majority of children under five years of age (98.5%) were breastfed (Table 3). There was a slightly lower proportion (96%) of breastfeeding in cases than in the control group (99.3%). Similarly, breastfeeding within 1 hour after birth was observed to be lower in cases (64%) than in controls (74.3%). On the other hand, in cases all children aged less than six months (100%) received exclusive breastfeeding compared with 81.8% in the control group. There was a higher proportion (66.7%) of breastfed children aged 6-24 months in the case group than in the controls (65.2%). Interestingly, there were a higher proportion of mothers who breastfed their children aged up to 24 months in cases (21.5%) compared to controls (4.7%).

Almost all children (99.5%) were given a complementary feeding schedule after 5 months. There were slight differences observed in the proportion of children fed

complementary foods after 5 months between cases (99%) and controls (99.7%). Similarly, there was a lower proportion of children in cases who were fed correctly in terms of the daily frequency of feeding (77.6%) compared to controls (94.5%). All mothers in controls (100%) provided their children with breakfast compared to mothers in cases (95.9%). Also, it was observed that a lower proportion of mothers provided lunch and dinner in cases than in controls; 91.8% VS 96.2% and 82.7% VS 95.2%, respectively.

The findings showed that the proportion of mothers providing a diet with minimum variety from food groups in their children's breakfast in cases was lower than mothers in controls (21.4% of cases VS 60.2% of controls). Similarly, for lunch, a lower proportion of mothers in cases (44.9%) than in controls (72%) provided a diet with minimum variety from the food groups. It was established that a lower proportion of mothers in cases (32.7%)

compared to controls (58.5%) included four components of the food groups in their children's dinner.

Interestingly, a lower proportion of mothers in

cases than in control group provided their children with meals which included meat or fish (cases 89.8%, controls 91.7%), green vegetables (cases 90.8%, controls 96.9%) and fruit (cases 93.9%, controls 98.6%).

**Table 3** The Mothers' practices about child feeding

Child feeding practice		Cases (n=100)		Controls (n=300)		Total (n=400)	
		No*	%	No	%	No	%
Breastfeeding	Yes	96	96.0	298	99.3	394	98.5
	No	4	4.0	2	0.7	6	1.5
Breastfeeding within 1 hour of birth	Yes	64	64.0	223	74.3	287	71.8
	No	36	36.0	77	25.7	113	28.2
Exclusive breastfeeding (n=13) <sup>§</sup>	Yes	2	100.0	9	81.8	11	84.6
	No	0	0.0	2	18.2	2	15.4
Breastfeeding until 24 months (n=174) <sup>@</sup>	Yes	22	66.7	92	65.2	114	65.5
	No	11	33.3	49	34.8	60	34.5
Breastfeeding up to 24 months (n=213)**	Yes	14	21.5	7	4.7	21	9.9
	No	51	78.5	141	95.3	192	90.1
Complementary feeding after 5 months	Yes#	99	99.0	299	99.7	398	99.5
	No	1	1.0	1	0.3	2	0.5
Daily frequency of feeding (n=387)*	Right	76	77.6	273	94.5	349	90.2
	Wrong	22	22.4	16	5.5	38	9.8
Giving breakfast (n=387)*	Yes	94	95.9	289	100.0	383	99.0
	No	4	4.1	0	0.0	4	1.0
Giving lunch (n=387)*	Yes	90	91.8	278	96.2	368	95.1
	No	8	8.2	11	3.8	19	4.9
Giving Dinner (n=387)*	Yes	81	82.7	275	95.2	356	92.0
	No	17	17.3	14	4.8	31	8.0
Minimum dietary diversity in (n=387)*							
Breakfast	Yes	21	21.4	174	60.2	195	50.4
Lunch	Yes	44	44.9	208	72.0	252	65.1
Dinner	Yes	32	32.7	169	58.5	201	51.9
Included in child meals (n=387)*							
Meat or fish	Yes	88	89.8	265	91.7	353	91.2
Green vegetables	Yes	89	90.8	280	96.9	369	95.3
Fruits	Yes	92	93.9	285	98.6	377	97.4

No\* Number

<sup>§</sup> Number of children under the age of 5 months

\* Number of children aged 6 to 59 months

@ Number of children aged 6 to 24 months

\*\* Number of children aged 25 to 59 months

Yes# Children was given complementary food in the right time

### Association between mothers' knowledge and practices of child feeding and underweight in under-5 children

There was a statistically significant association between mothers' knowledge about nutritious foods for children and their children under-five being underweight ( $p<0.001$ ) (Table 4). The risk of a child being underweight was 8.9 times

higher in children of mothers with a lower percentile knowledge compared with the children of mothers with higher percentile knowledge (OR, 8.9;  $p<0.001$ ; 95% CI, 4.0-19.6). Mothers with a medium knowledge ( $p=0.08$ ) were not associated with children being underweight.

The mothers' child feeding practices were statistically and positively associated with the child's nutritional status ( $p<0.001$ ) (Table 4). Mothers within a lower percentile regarding their practice of feeding their children had a higher risk of having an underweight child when compared with the higher percentile practice of child feeding (OR, 15.2;  $p<0.001$ ; 95% CI, 5.5-41.7). The risk of children

becoming underweight was 3.2 times more likely in mothers who had the medium percentile practice of feeding their children compared to the risk for children whose mothers had the higher percentile practice of feeding their children (OR, 3.2;  $p<0.05$ ; 95% CI, 1.1-9.4).

**Table 4** The relationship between the mothers' knowledge and practices of child feeding and children being underweight

		Cases (n=100)		Control (n=300)		Odds Ratio	95% CI	p Value
		No. <sup>#</sup>	%	No. <sup>#</sup>	%			
<b>Knowledge</b>								<b>&lt;0.001</b>
High	(>66.7%)	9	9.0	89	29.7	Ref <sup>s</sup>	Ref	Ref
Medium	(33.3% - 66.7%)	27	27.0	136	45.3	2.0	0.9-4.5	0.08
Low	(<33.3%)	64	64.0	75	25.0	8.9	4.0 -19.6	<0.001
<b>Practices</b>								<b>&lt;0.001</b>
High	(>66.7%)	6	6.0	92	30.7	Ref	Ref	Ref
Medium	(33.3% - 66.7%)	14	14.0	87	29.0	3.2	1.1-9.4	<0.05
Low	(<33.3%)	80	80.0	121	40.3	15.2	5.5-41.7	<0.001

No.<sup>#</sup> Number of cases and controls exposed

Ref.<sup>s</sup> Reference category

## DISCUSSION

As found in this study, there was significant association between both mothers' child feeding knowledge and practices. Several reasons can be explained why this condition happens. Firstly, the majority of mothers in cases had a lower educational level compared to mothers in controls. This can be understood that mothers who had low educational level tend to have an inadequate capacity for reading. The mothers could not also synthesize health information from the various available sources, including the media ([Abuya, Onsomu, Kimani, & Moore, 2011](#)). Besides that, there were limited mass media sources which promoted appropriate child feeding practices in rural remote areas in Konawe District. Health practitioners or health promoters had difficulty to reach those rural remote areas because of many factors such as limited health workers in the community health centre, poor street condition and less public transportation. Therefore, there were fewer visits from health

practitioners in those areas. Some of rural areas also did not have accessibility to electricity. This have caused rural mothers did not have big chances to read or get information about appropriate child feeding practices. There was also less opportunity to make sharing informaion between mothers in the villages because they were very busy in the garden. They helped their husband to plan in the rice field or garder. They usually went to the garden from morning to evening every day. There was less household who had a television in the home.

In Indonesia, each village were provided a comprehensive health care but this health care was conducted each month for each village, including in the rural remote areas. The comprehensive health care provides some health services such as weighting for babies or children under-five to monitor their nutritional status, immunization, medical treatment, family planning, distribution vitamin A for each 6 months and giving health education for



mothers relating about child and mother health. However, some of mothers in the rural remote areas which helped their husband in the garden tended to have limited visits to that comprehensive health care. Besides that, mothers who had severely underweight children tended to be shy to attend in that comprehensive health care because of their children nutritional condition. Those conditions have affected mothers to have less information about appropriate child feeding practices in the rural villages in Konawe District. Another study also has explained that a mother living in a community with less educated women also tends to have poor knowledge and practices of child feeding because there will be no sharing of knowledge and no imitation of particular behaviours (Moestue & Huttly, 2008). This is because less educated people tend to have a less demand for services and infrastructures, so a mother's awareness about healthy behaviours is likely to be poor.

Otherwise, mothers who had higher education tend to work outside of their house. For example, several rural mothers became primary school teachers or civil servants in the sub-district government institutions. For working mothers, responsibility to child rearing was given for senior family members or household servants who they generally had lower education and poor information. Senior family members were usually grant mothers or aunts who still believed their old tradition including giving food for babies who aged under 4 months. Therefore, although the mothers had high education or had enough knowledge about child feeding practices, but their babies still were feed before 6 months. The working mothers tended to give no exclusive breastfeeding because they did not know how to put their breast milk when they were working in their office. They changed breast milk with formula milk which has different nutrition compound with breast milk.

As explained by other study, the level of a mother's knowledge about suitable foods for children can influence significantly to her choices in providing food for her children

under five years of age (Variyam, Blaylock, Lin, Ralston, & Smallwood, 1999). This is because a person having a better knowledge of feeding children well tend to be increasingly aware about particular behaviour changes that are known and believed to have a positive effect on them (Bandura, 2004). Thus, when compared with the mother having less knowledge about suitable child feeding practices, and who chooses and feeds her children under-five with inappropriate foods, the knowledgeable mother is more likely to choose and feed her children healthy foods (Appoh & Krekling, 2005). In addition, personal knowledge is a basis for people to act to change their behaviour (Bandura, 2004). Personal behaviour change is also influenced by social persuasion, performance attainments, misery experience and the physiological state (Bandura, 2004; Rosenstock, Strecher, & Becker, 1988). Thus, mothers who are knowledgeable about feeding their children well are more likely to receive greater support from both family and society, so they can continue to practice better child feeding strategies when compared to mothers with less knowledge and less social support.

Moreover, mothers in cases were found to have a lower monthly family income compared to mothers in controls. This means that the majority of mothers who had a lower knowledge and practices lived with low income as well. Thus, they may also struggle to provide adequate nutritious foods for their children under-five (Hong, 2007). Additionally, poor families also could not afford to construct a safe housing environment with clean water and sanitation facilities (El Taguri et al., 2009). Thus, they also could not do hygienic practices including child's food preparation and this condition increased the transmission of infectious diseases in children under-five such as diarrhoea (Alasfoor, Traissac, Gartner, & Delpeuch, 2007; El Taguri et al., 2009). Diarrhoea and other infectious diseases reduce children's food intake and nutrient absorption (Satterthwaite, Hart, Levy, & Mitlin, 1996). Ill children will also experience a loss of appetite, thus leading to a lower food intake (Hong, 2007). Thus, a



mother with better knowledge of child feeding does not mean that she can automatically feed healthy and hygienic foods to her children under-five because poor mothers were found to have difficulty buying health foods and providing better housing conditions ([Block, 2007](#); [M. T Ruel & Menon, 2002](#); [Tasnim, 2017](#)).

### Implication for future health policies and practices

These findings have implications for future policies and practices. As discussed above, several aspects of the study note specific areas needing attention in order to improve children's nutritional status.

Firstly, health promotion and health education program need to be improved in terms of their format of delivery and their approach. Health promotion must be conducted vary a great deal in contact time. It is not only conducted in the comprehensive health care for each month for each village, but also in the informal meetings for village communities. Health promotion must involve community health volunteers (Cadres) and women organization in the village and district level. The role of the comprehensive health care must be based on a community development and empowerment concept, thus, the comprehensive health care can be effective program to improve child's health and nutritional status ([President of Republic of Indonesia, 2012 \(Indonesian\)](#)).

Secondly, because the level of mother's education influences significantly to mother's capacity to synthesize and seek health information which determine the level of mother's knowledge and practices of child feeding. Therefore, development strategies encouraging young girls to enrol a senior high educational level are also crucial, particularly in the villages and remote areas. In the future, national education policies need to emphasize these strategies in order to increase women's educational status. In addition, this policy should also encourage schools to develop a curriculum that can provide the students with nutritional knowledge.

### CONFLICT OF INTEREST

The authors have no conflict of interest associated with the material presented in this paper.

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