



INFANT AND YOUNG CHILD FEEDING PRACTICES AMONG UNDER TWO YEARS CHILDREN IN THREE RURAL SOUTHERN YEMENI GOVERNORATES: A COMMUNITY BASED PRE – POST EDUCATIONAL INTERVENTION STUDY

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ABSTRACT

Purpose: The Global Strategy for Infant and Young Child Feeding (IYCF) was developed to revitalize world attention to the impact of feeding practices on the nutritional status, growth and development, health, and survival of infants and young children. In Yemen, IYCF indicators are not extensively investigated. The objective of this paper is to compare IYCF indicators before and after education intervention project in five rural southern Yemeni districts.

Materials and Methods: House-to-house community-based cross-sectional surveys were conducted before (May–July 2013) and after education project implementation (March–April 2017) in five targeted districts. The World Health Organization 30 by 30 two-stage cluster sampling technique was used to approach orally consented mothers of under 2 years children using a pretested structured questionnaire based on Generic Feeding Questionnaire for children 0-23 months. Statistical analysis was done to compare nine IYCF indicators with chi square test. Statistical significance was set at $P < 0.05$.

Results: There were 526 respondents in the pre-intervention and 607 in the post-intervention phases. All IYCF indicators were significantly improved in the overall post-intervention sample except for continuous breastfeeding in the age 20–23 months. At the governorate level, there was significant improvement in the post-intervention phase in most indicators with widely different levels of improvement.

Conclusion: Education intervention resulted in significant improvement in IYCF indicators. If the existing health system is uncappable to support the sustainability of such gain, partners has to consider implementation of educational projects as part of the efforts to achieve relevant sustainable development goals.

Keywords: Community Survey, Education Intervention, Child Indicators, Yemen.

INTRODUCTION:

Good nutrition during childhood is vital to ensure that children develop both physically and mentally to the fullest potential (Costello, 2016). Undernutrition is the underlying cause of death in an estimated 45% of all deaths among children under five years of age (WHO, 2017). World Health Organization (WHO, 2009) and United Nations Children Fund (UNICEF, 2017a) are placing great emphasis on promoting good child care practices at home and in the community because good child care practices are very crucial for sustainable child health and development. Communities need to be strengthened and families supported to provide the necessary care to improve child survival, growth and development.

In 2002, the WHO and UNICEF adopted the Global Strategy for infant and young child feeding (IYCF). The strategy was developed to revitalize world attention to the impact that feeding practices have on the nutritional status, growth and development, health, and survival of infants and young children. IYCF has been engaging the attention of scientists and planners since long because optimal IYCF is essential for child growth (WHO and UNICEF, 2003). The period during pregnancy and a child's first two years of life are considered a "critical window of opportunity" for prevention of growth faltering (WHO and UNICEF, 2007). In 2008, the WHO has developed a comprehensive set of fifteen IYCF indicators to monitor and to guide the feeding practices of young children (WHO et al., 2008). These are eight core indicators include: (1) early initiation of breastfeeding (EIBF); (2) exclusive breastfeeding (EBF) under six months; (3) continued breastfeeding for one year; (4) the introduction of solid, semi-solid or soft foods; (5) minimum dietary diversity (MDD); (6) minimum meal frequency (MMF); (7) minimum acceptable diet (MAD); and (8) consumption of iron rich or iron fortified foods. In addition, there are seven optional indicators which are: (1) children ever breastfed, (2) continued breastfeeding at 2 years Age, (3) appropriate breastfeeding, (4) predominant breastfeeding under 6 months, (5) duration of breastfeeding, (6) bottle feeding of infants, and (7) milk feeding frequency for non-breastfed children. However, many infants and children receive suboptimal feeding globally. For instance, only 36% of infants aged 0 – 5 months globally are exclusively breastfed during 2004 – 2014. Furthermore, less than quarter of infants 6–23 months of age in many countries met the requirements of MDD and MMF appropriate for age (WHO, 2017).

Yemen is a 'low income country' (World Bank, 2019). It ranks low among countries rated according to the United Nations Development Program Human Development Index for 2018 (178 out of 189) (UNDP, 2019). Yemeni children are living in an alarming daunting situation. Yemen has the world's second high-est rate of chronic malnutrition, after Afghanistan, and about half the population live in deep poverty. More than half the children under five years of age suffer from chronic malnutrition. In some parts of the country, one in three children are malnourished – among the highest malnutrition levels in the world. Yemen has

lost a decade's worth of gains in public health as a result of war and economic crisis. There is an estimated 63,000 children dying in 2016 of preventable causes often linked to malnutrition and 3.3 million people, including 2.2 million children, across the Arab peninsula's poorest country are suffering from acute malnutrition including nearly half a million children under the age of five with severe acute malnutrition. Furthermore, it is estimated that 63 out of every 1,000 live births now dying before their fifth birthday, against 53 children in 2014 (UNICEF, 2017b). Volatile armed conflicts and rapidly shifting frontlines have been happening in the midst of growing poverty and an already large-scale humanitarian crisis. As the conflict rages on, the needs of vulnerable children continue to grow. Boys and girls are growing up in the poorest country in the Arab region (Save the children et al., 2017).

According to the latest Yemen National Health and Demographic Survey (YNHDS) in 2013; the nutritional status indicators of Yemeni under five children are among the worst in the world with the prevalence of 44% for underweight, 41% for stunting and 14% for wasting. Furthermore, there is some evidence that IYCF indicators are seriously deviated from the recommendation with an exclusive breastfeeding rate among infants under six months of only 10.3% and 30% of infants are given milk other than breast milk (RoY, 2014). Some of the IYCF indicators were partially addressed in a number of health and nutrition surveys in selected Yemeni governorates (RoY et al., 2013; 2016; 2017). However, IYCF indicators are not extensively investigated. This paper presents the findings of a pre–post IYCF education intervention evaluation survey as part of a comprehensive project implemented by the Field Medical Foundation (FMF); a local highly esteemed non-governmental organization with the support of UNICEF named "Integrated nutrition response for vulnerable Under five children and pregnant and lactating women in five rural districts in three southern Yemeni Governorates. The objective of this study is to compare the IYCF in the targeted districts before and after the project implementation.

MATERIALS AND METHODS:

Introduction:

The intervention project is an integrated response for vulnerable under-fives children and pregnant and lactating women with integration of Communication for Development (C4D) approach engaging with community including children and adolescents promoting for life-saving key practices in Child Protection, Health and Nutrition, WASH and Education). The project aims to ensure community adoption of critical mother and child health and hygiene practices including proper feeding, vaccination, handwashing with soap among others (Hussain, 2017). The project was designed to:

- Provide critical information and key messages on Health, Child Nutrition (with a focus on IYCF), WASH, Child protection, and Education.

- Monitor and report emerging risky and positive practices,
- Encourage and support participation of affected population to effectively respond to the immediate challenges using both interpersonal and local media. communication activities.

- ii. Those who lives permanently (not a temporary resident) in the same household and spends the most time caring for the index child.
- iii. For those having more than one child U5 years, the youngest child will be the index child.

The educational activities include:

- Household visits and Community meetings to conduct the key messages regarding (health, nutrition, child protection, wash, Education).
- Weekly religious meeting (Imams/Jumaah sermons)
- Counselling sessions
- Focus group discussions
- Theatre/skits sessions for key messages.
- Distribution of education flashes, posters and brochures

Exclusion criteria: Any visited household without the presence of the mother or primary caretaker or with mother or primary caretaker not having at least one child U5 years of age were excluded from the study.

Sampling:

The traditional WHO 30 by 30 two-stage cluster survey technique was used through in both surveys through which 30 clusters of 30 households were surveyed (Singh et al 1996 and Rose et al 2006).

Stage I: The first stage of the survey consisted of the random selection of 30 clusters from a population list of the five districts in the three governorates. Clusters were selected with a probability proportionate to size of U5 population in the area.

Stage II: For the second stage, 30 households within each cluster was selected. In each cluster, the data collection team went to the centre of the area being surveyed. Following the classic WHO expanded program on immunisation methodology for cluster sampling surveys, the team selected a direction at random from the choice of directions they face at the centre to select the first house and continue accordingly to finish the required number of households (Henderson and Sundansan, 1982). It is worth mentioning that serious efforts had been paid to ensure that the intervention is delivered to the same areas included in the baseline preintervention areas as well as to include these areas in postintervention survey. However, the general country political and military instability, associated poor security status, and population displacements during the project implementation particularly in Al-Dhala governorate entails some modification in the postintervention areas as shown in the table below. However, since IYCF are primarily calculated for under two years children, all the analysis in this paper address this group only.

Study Design and Setting:

House to house community-based cross-sectional surveys were conducted before and after the project implementation in the targeted five districts from three south-eastern governorates in Yemen. The pre-intervention survey was conducted in the period May – July 2013 whereas the post intervention survey was conducted in March – April 2017.

Target Population:

The target population was mothers or primary caretakers with U5 years children living in households in the five districts at the time of data collection.

Inclusion criteria: An eligible mother or primary caretaker in the visited household is:

- i. Those having or caring for at least one U5 years of age.

Table 1. Districts' sub divisions and the selection procedure of the required number of clusters and households in each district in the three governorates

Governorate	District	Total U5 children	% of U 5 children relative to the total No. of districts	Required No. of households	Preintervention Survey		Postintervention Survey	
					Randomly selected area	Total No. of households in each area (No. of required clusters)	Randomly selected area	Total No. of households in each area (No. of required clusters)
Abyan	Al-Mahfed	5860	14.1	127	District Center Labakhah Al-Kafah	154 (2) 47 (1) 81 (1)	District Center Labakhah Al-Kafah	154 (2) 47 (1) 81 (1)
	Ahwar	5506	13.2	119	Al-Masani Al-Mahsamah Center of district Henad	48 (1) 71 (1) 155 (1) 71 (1)	Al-Masani Al-Mahsamah Center of district Henad	48 (1) 71 (1) 155 (1) 71 (1)
Subtotal	11366	27.3	246	-	627 (8)	627 (8)	627 (8)	
Shab-wah	Merkha Alulya	7096	17.0	153	Al-Khawar Halhel Al-Gefrah Al-Aqer Al-Khayas	40 (1) 34 (1) 50 (1) 46 (1) 66 (1)	Al-Khawar Helhel Al-Gefrah Al-Aqer Al-Khayas	40 (1) 34 (1) 50 (1) 46 (1) 66 (1)
Subtotal	7096	17.0	153	-	-	-	-	-
Al-Dhala	Al-Azariq	8882	21.3	192	District Center Al-Gebalah Al-Haql Al-Mazbah Al-Masnah Aden -Hamadah	65 (2) 46 (1) 38 (1) 38 (1) 75 (1) 111 (1)	Al-Haql	38 (7)
	Al-Husha	14331	34.4	309	Al-Autom Al-Khalaw Habeel Ketam Al-Sheber Al-Mezabah Al-Akamah Al-Daqah Al-Khyariyah Yrakh Hamdan	44 (1) 62 (1) 60 (1) 44 (1) 118 (1) 176 (1) 128 (1) 57 (1) 88 (1) 58 (1)	Al-Khalaw Habeel Ketam Al-Sheber Al-Mezabah Al-Akamah	62 (1) 60 (1) 44 (1) 118 (2) 176 (5)
Subtotal	23213	55.7	561	-	1253 (17)	494 (17)	494 (17)	
Total	41675	100.0%	900	-	30 cluster	30 cluster	30 cluster	

Variables:

Independent variables were family characteristics including locality; child age, mother education; mother working status; father education; father work; family size, family type; and family income.

Outcome variables were defined based on IYCF indicators guidelines (WHO et al., 2008):

- **EIBF:** putting the new borne on the breast within one hour of birth.
- **EBF:** only breast milk, no other liquids or solids, not even water, with the exception of oral rehydration solution, or drops/syrups of vitamins, minerals or medicines.
- **Predominant breastfeeding:** infants whose predominant source of nourishment is breast milk, but who also receive other fluids. These include liquids, such as water-based drinks, fruit juice and ritual fluids. Non-human milk and food-based fluids are not allowed.
- **MDD:** based on the consumption of foods from at least four or more varieties of foods from the following seven food groups in the last 24 hours at the time of the survey: (i) grains, roots and tubers; (ii) legumes and nuts; (iii) dairy products; (iv) flesh foods; (v) eggs; (vi) vitamin A rich fruits and vegetables; and (vii) other fruits and vegetables.
- **MMF:** the number of times the child was fed complementary foods based on age requirements in the last 24 hours. For breastfed children, the frequency should be at least 2 times for 6–8 months, and at least 3 times for 9–23 months of age.
- **MAD:** a composite indicator of minimum dietary diversity and minimum meal frequency. When the child meets both the minimum diversity and the minimum meal frequency in the last 24 hours, the child is considered to have met the WHO recommended MAD.

Study Instruments:

A pre-tested structured interview questionnaire was used. The questionnaire was developed based on the Indicators for assessing infant and young child feeding practices (WHO et al., 2008) and the Generic Feeding Questionnaire for Children 0-23 months (WHO, 2010).

Statistical Analysis:

The questionnaire sheets were reviewed and coded after completion. Double-entry of the data to SPSS -Statistical Package for Social Sciences-22 (SPSS Incorporation, Chicago, IL, USA) was done by the research team with daily check of quality of data entry and immediate errors correction. Further checks on quality control and cleaning of the data were carried out later. Descriptive statistics were computed to determine frequency of independent variables as well as the prevalence of the following IYCF indicators using the standard 24 hours recall methods based on international guidelines (WHO et al., 2008):

Core indicators:

1. **EIBF:** Proportion of children born in the last 24 months who were put to the breast within one hour of birth.
2. **EBF under 6 months:** Proportion of infants 0–5 months of age who are fed exclusively with breast milk
3. **Continued breastfeeding at 1 year:** Proportion of children 12–15 months of age who are fed breast milk
4. **Introduction of solid, semi-solid or soft foods:** Proportion of infants 6–8 months of age who receive solid, semi-solid or soft foods
5. **MDD:** Proportion of children 6–23 months of age who receive foods from 4 or more food groups
6. **MMF:** Proportion of children 6–23 months of age who receive solid, semi-solid, or soft foods the minimum number of times or more.
7. **MAD:** Proportion of children 6–23 months of age who receive a minimum acceptable diet (apart from breast milk). This composite indicator is calculated for children 6–23 months of age who had at least the MDD and the MMF.

Optional indicators:

8. **Predominant breastfeeding under 6 months:** Proportion of infants 0–5 months of age who are predominantly breastfed
9. **Continued breastfeeding at 2 years:** Proportion of children 20–23 months of age who are fed breast milk

Inferential analysis with Chi Square test (2) was used to statistically compare pre- and post-intervention data in order to assess the difference in the selected

IYCF indicators between pre- and post-interventions. It was replaced with Fisher exact probability (FEP) in case of small cell frequency. Statistical significance was considered at $P < 0.05$.

Research Ethics:

All mothers/caretakers were briefed on the conduct of the study. Later, all respondents were asked to give their oral permission using an informed consent form. The study was conducted after receiving the necessary permission from the health offices in the governorates.

RESULTS AND DISCUSSION:

The changes in mothers IYCF practices before and after the educational project interventions are presented here in terms of selected core and optional indicators as defined by the WHO guidelines (WHO et al., 2008) by comparing between pre-intervention and post-intervention data.

Family characteristics:

Table 2 shows that 526 respondents were included in the pre-intervention and 607 in the post-intervention phases. The table also shows the number of the respondents enrolled in each governorate which were proportionally approached as explained in the method section. The sample characteristics are homogeneous in both phases (no significance difference) with regards to the included number of respondents with around half of them from Al-Dhalae and quarter from Abya. Likewise, no significant difference was found regarding family type with 60.1% and 54.9% of nuclear type in the pre-intervention and post-intervention phases respectively. In the same context, no significant difference was detected with regards to child age categories.

The overall unfavourable socioeconomic conditions are obvious in the study governorates. Post-intervention survey reveals significantly better mother education (11.2% with secondary education and above compared to 4.2% in the pre-intervention), father education (40.1% with secondary education and above compared to 34.1% in the pre-intervention) and family size (33.8% family size of ≥ 9 members compared to 44.7% in the pre-intervention). On the other hand, more families have relatively stable monthly salary in the pre-intervention sample compared to the post-intervention sample as there were more working mothers (15.2%) and fathers with governmental jobs (40.5%) and farmers (30.2%) compared to their post-intervention counterparts (7.2%, 32.9% and 23.1% respectively). This could explain the significantly higher monthly per capita income in the pre-intervention phase with 53.6% having the median income value and above (Yemeni Riyal 5000) compared to 49.0% (5833 respectively) in the post-intervention phase. However, the findings in both phases are within the range of findings encountered in the most recent health and nutrition surveys in Abyan (RoY et al., 2013), Al-Dhalae (RoY et al., 2016) and Shabwa (RoY et al., 2017).

Evidence-based correct feeding practices from early childhood are important for normal physical and mental growth, normal development, optimum immunity, reduce atopic conditions and training the child in correct feeding habits (WHO, 2017). Such practices are evaluated by certain core and optional indicators (WHO et al., 2008). EIBF is one of the globally recommended core IYCF practices practice. This entails that all infants should start breastfeeding within one hour of birth. Breastfeeding initiation in the first hours of birth increases the chance of getting the colostrum and its benefits (Labbok et al., 2004), mother-infant bond (Himani and Kumar, 2011), as well as successful establishment of breastfeeding (Begum and Dewey 2010). EIBF is low-cost and has substantial potential to reduce neonatal and early infant morbidity (Keino et al., 2014) and mortality (Edmond, 2008). Together with EBF, can be considered as key public health interventions (Patel et al., 2015). Unfortunately, less than 40% of infants in resource limited settings are breastfed within an hour of birth (Bhuta et al., 2013). The present study (Table 3), shows that only around one third of infant were breastfed in the first hour of life in the baseline evaluation (33.7%) with a significant incensement to 89.9% in the post-intervention study. Significant rise in EIBF was also observed in the three governorates. Though the percentage of improvement is nearly the same in three governorates, Shabwa is still lagging behind Abyan and Al-Dhalae with 77.6% of mothers reported EIBF.

In spite of the well-recognized importance of EBF during the first six months of life, only 39% of infants at this age worldwide are exclusively breastfed in 2016 with wide variations among countries (UNICEF, 2017a). The present study (Table 3) shows higher prevalence of EBF in both arms (40.7% pre-intervention vs. 72.0% in post-intervention study) compared with the national level of 10.3% (RoY, 2014). The governorates figures are also much better than what were reported in the most recent nutrition survey in Al-Dhalae (RoY et al., 2016) and Shabwa (RoY et al., 2017). The same table shows significant increment in the EBF rate associated with reduction in predominant breastfeeding rate in Abyan and Al-Dhalae in the post-intervention survey but not Shabwa (Table 4). The improved figures might be related to the educational messages associated with the project intervention.

Sound complementary feeding practices are among the core IYCF indicators. These include indicators related to timely introduction of solid, semi-solid or soft foods to infants after 6 months and appropriateness in term of number of feeds appropriate to age and diversity of foods offered (WHO and UNICEF, 2003). In the present evaluation, Table 3 shows that the baseline complementary feeding

indicators were mostly far from optimum and improved significantly by the end of the program implementation.

Appropriate complementary foods should be introduced in a timely fashion, beginning when the infant complete six months of age. Early, late or inappropriate complementary feeding may lead to malnutrition and poor growth particularly in developing countries where foods are often nutritionally inadequate and hygienically unsafe (WHO and UNICEF, 2007). In Table 3, timely introduction of complementary feeding indicator significantly increased from 37.5% (pre-intervention) to 95.4% (post-intervention) in the overall sample. Similarly, the indicator had significantly increased in Abyan and Al-Dhalee (but not Shabwa); most obviously in Al-Dhalee (from 28.9% to 95.8%). The Table also demonstrates that the MMF among children 6-8 months (at least 2 feeds) and among children 9-23 months (at least 3 feeds) had also significantly increased from baseline value of 36.3% to 83.9% and 83.1% to 91.1% respectively in the overall sample. However, significant increment was observed in Abyan and Al-Dhalee but not in Shabwa. Rather, there is insignificant reduction in both indicators in Shabwa. However, both figures are higher than what recently reported from Shabwa (RoY et al., 2017) for MMF (35.4 and 45.4% in the plateau and low land zones respectively). Likewise, figures reported from Al-Dhalee in our study are much better than those reported from nutrition survey (RoY et al., 2016). No comparable figures reported from Abyan.

Food diversity is another attribute of appropriate complementary feeding practices which entails receiving food from at least four different food groups (WHO et al., 2008). Table 3 also shows significant improvement in the post-intervention survey (28.2%) compared to the baseline (4.5%). The same was observed in the three governorates. It is noteworthy that only the post-intervention value of Abyan at 50% is higher than the reported value from the governorate nutritional survey of 22% (RoY et al., 2013) but the post-intervention figures are either lower (19.5%) than the reported figure of 23.6% in Al-Dhalee (RoY et al., 2016) or within the reported range in Shabwa (17.5%) at 16.3-25.9% (RoY et al., 2017). This means that despite the positive gain in this practice represented by the improvement in food diversity indicators, further efforts are needed in these areas. This is because diversifying children food is related to many factors including awareness, cultural background, economic factors, and food availability among others (Jushi et al., 2006).

Food acceptability is a composite indicator as a child is considered as having acceptable food if he receives the MMF and the MDD according to his age (WHO et al., 2008). Similar to previous complementary feeding indicators, food acceptability significantly improved from the baseline values in the overall sample and the specific governorates values (Table 3) with major improvement observed in Abyan. It is worth mentioning that this indicator showed the least improvement compared to other complementary feeding indicators. The reported figures from recent nutritional surveys are also low. They are 7.5% in Al-Dhalee (RoY et al., 2016) and 1.5% to 2.6% in the plateau and low land zones respectively in Shabwa (RoY et al., 2017). This could be explained by the fact that this is a composite indicator depending on the number of meals and food diversity which themselves depend on multiple enabling factors (Joshi et al., 2006).

Continuation of breastfeeding up to 2 years or beyond is one of the IYCF recommended practices. This practice is measured by one core indicator for breastfeeding at 12 – 15 months and another optional indicator for continuation of breastfeeding for children aged 20 – 23 months (WHO et al 2008). In the present study (Table 3), breastfeeding at 12 – 15 months has significantly increased in the post-intervention overall sample (from 28.7% to 88%), Abyan (from 22.6 to 90%), Shabwa (from 37.5% to 78.9%) and Al-Dhalee (from 28.6% to 89.8%). However, at age 20–23 months (Table 4), there was insignificant improvement in continuous breastfeeding in the post-intervention overall sample, Abyan and Al-Dhalee and insignificantly reduced rate in Shabwa (from 80% to 60%).

CONCLUSION:

This two-phase study shows that IYCF interventional communicative efforts resulted in significant improvement in most practices. Such findings confirm that communicative health intervention can improve relevant indicators. If the existing formal health system is uncappable to support the sustainability of such improvement and gain in IYCF practices and ensure its future development in the needy areas, developmental partners has to consider implementation of such educational projects as part of the efforts to achieve relevant sustainable development goals.

Acknowledgement:

The authors are very grateful to the FMF for their great efforts in implementing the project and facilitating the field work of these surveys. Special thanks are due to respondents, data collectors and field supervisors for the hard work in exceptionally difficult situations. Our sincere thanks go to the UNICEF for the financial support of the project and the study.

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Table 2. Family Characteristics in Three Rural Southern Yemeni Governorates

Characteristic	Pre-intervention (n=526)		Post-intervention (n=607)		χ^2 P value	
	No.	%	No.	%		
Locality						
Abyan	143	27.2	169	27.8	0.504 NS*	
Shabwah	86	16.3	107	17.6		
Al-Dhalae	297	56.5	331	54.5		
Mother education						
Illiterate/read and write	475	90.3	477	78.6	29.8 <0.001	
Basic/primary to preparatory	29	5.5	62	10.2		
Secondary and above	22	4.2	68	11.2		
Working status						
Working	80	15.2	44	7.2	18.3 <0.001	
Non working	446	84.8	563	92.8		
Father education						
Illiterate/read and write	260	49.4	239	39.3	11.7 0.003	
Basic/primary to preparatory	87	16.5	125	20.6		
Secondary and above	179	34.1	243	40.1		
Father work						
Clerk/ employed/teacher/military (Governmental job)	213	40.5	200	32.9	46.8 <0.001	
Farmer	159	30.2	140	23.1		
Per day payment	68	12.9	170	28.0		
Immigrant	36	6.8	30	4.9		
Unemployed	34	6.5	33	5.4		
Others	16	3.1	34	5.6		
Family size (persons)						
<5	56	10.6	104	17.1	23.3 <0.001	
5-6	103	19.6	160	26.4		
7-8	132	25.1	138	22.7		
≥9	235	44.7	205	33.8		
Mean ± SD	8.68 ± 3.9		7.83 ± 3.9			
Family size (years)						
<6	145	27.6	182	30.0	4.3 NS	
6-<12	136	25.9	179	29.5		
12-<24	245	46.5	246	40.5		
Mean ± SD	9.43 ± 5.2		9.98 ± 5.9			
Family type						
Nuclear	316	60.1	333	54.9	3.1 NS	
Extended	210	39.9	274	45.1		
Monthly Per capita income (YR)						
Pre-intervention			Post-intervention			
<3750	131	24.9	<3750	142	23.4	8.2 0.041
3750-4999	113	21.5	3750-5832	168	27.7	
5000-7999	151	28.7	5833-8570	140	23.1	
≥8000	131	24.9	≥8571	157	25.9	

NS: Statistically not significant
Significance was tested with Chi squared test (χ^2)

Table 3. Selected IYCF Core Indicators in Three Rural Southern Yemeni Governorates, Pre-Post Education Evaluation

Indicator	Overall sample				Abyan				Shabwa				Al-Dhalee							
	Pre-intervention (n=526)		Post-intervention (n=607)		Pre-intervention		Post-intervention		Pre-intervention		Post-intervention		Pre-intervention		Post-intervention					
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%				
					n=143		n=169		n=86		n=107		n=297		n=331					
Children 0–23 months: EIBF	188	33.7	545	89.9	58	40.6	154	91.1	21	24.4	83	77.6	119	40.1	308	93.1				
	P= <0.001				P= <0.001				P= <0.001				P= <0.001							
	n=145		n=182		n=49		n=43		n=19		n=44		n=77		n=95					
Infants 0 – 5 months: EBF	59	40.7	131	72	14	28.6	33	76.7	10	52.6	24	54.5	35	45.5	74	77.9				
	P= <0.001				P= 0.008				NS				P= <0.001							
Children 6–8 months					n=80		n=87		n=22		n=31		n=13		n=8		n=45		n=48	
Introduction of complementary foods	30	37.5	83	95.4	9	40.9	30	96.8	8	61.5	7	87.5	13	28.9	46	95.8				
	P= <0.001				P= <0.001				NS				P= <0.001							
Minimum meal frequency (at least 2 feeds)	29	36.3	73	83.9	9	40.9	24	77.4	12	92.3	7	87.5	8	17.8	42	87.5				
Children 9-23 months					n=301		n=425		n=72		n=126		n=54		n=63		n=175		n=236	
Minimum meal frequency (at least 3 feeds)	250	83.1	308	91.1	51	70.8	83	87.4	51	94.4	46	83.6	148	84.6	179	95.2				
	P= 0.002				P= 0.007				NS				P= <0.001							
Children 6-23 months					n=381		n=425		n=94		n=126		n=67		n=63		n=220		n=236	
Minimum dietary diversity (foods from ≥ 4 food groups)	17	4.5	120	28.2	4	4.3	63	50	0	0	11	17.5	13	5.9	46	19.5				
	P= 0.002				P= <0.001				P= 0.002				P= <0.001							
Children who had at least the minimum dietary diversity & the minimum meal frequency	7	1.8	113	26.6	3	3.2	59	46	0	0	8	12.9	4	1.8	47	19.8				
Children 12 – 15 Continuous breastfeeding					n=174		n=108		n=31		n=30		n=24		n=19		n=119		n=59	
Breastfeeding in the last 24 hours	50	28.7	95	88	7	22.6	27	90	9	37.5	15	78.9	34	28.6	53	89.8				
	P= <0.001				P= <0.001				P= <0.001				P= <0.001							

NS: Statistically not significant
Significance was tested by Chi squared test (χ^2)

Table 4. Selected IYCF Optional Indicators in Three Rural Southern Yemeni Governorates, Pre-Post Education Evaluation

Indicator	Overall sample				Abyan				Shabwa				Al-Dhalee							
	Pre-intervention (n=526)		Post-intervention (n=607)		Pre-intervention		Post-intervention		Pre-intervention		Post-intervention		Pre-intervention		Post-intervention					
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%				
Infants 0 – 5 months					n=145		n=182		n=49		n=43		n=19		n=44		n=77		n=95	
	45	31.0	26	14.3	18	36.7	5	11.6	6	31.6	8	11.6	21	27.3	13	13.7				
	P= <0.001				P= 0.005				NS				NS							
Children 20–23 months					n=12		n=31		n=4		n=8		n=5		n=5		n=3		n=18	
	9	75.0	26	83.9	3	75.0	8	100.0	4	80.0	3	60.0	2	66.7	15	83.3				
	NS				NS				NS				NS							

NS: Statistically not significant
Significance was tested by Chi squared test (χ^2)