

## Research Article

# Infant and Young Child Feeding Practice and Associated Factors among 0-23 Old Months of Children in Irrigated and Non-Irrigated Areas of Dangila District, North West of Ethiopia

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**Background:** Infant and young child feeding practice is a cornerstone of care for child development both mentally and physically. Failure to implement proper infant and young child feeding practices is associated with an increased risk of childhood morbidity and mortality.

**Objective:** To assess the prevalence of infant and young child feeding practices among 0-23 months-old children in irrigated and non-irrigated areas of Dangila Woreda, North-west Ethiopia, 2021.

**Methods:** A community-based comparative cross-sectional study was conducted from Dec 1, 2020 to Jun 1, 2021 with a total of 823 mothers who have infants and young children 0-23 months of age in 9 selected Kebeles. A stratified sampling technique was implemented to select irrigated and non-irrigated kebeles and study units. Data was collected by the face-to-face interview method. Bivariate and multivariate analysis were used. Variables with  $p < 0.05$  were taken as statistically significant and independently associated with infant and young child feeding practice. An adjusted odds ratio, along with a 95% confidence interval, was used to assess the strength of the association.

**Result:** Among 823 households visited, 802 participants gave complete responses, a response rate of 97.4%. The overall prevalence of infant and young child feeding practice was 62.56%. Of these, 72.8% (95%CI: 67.5%, 76.1%) from irrigated and 52.2% (95%CI: 47.8%, 57.4%) from non-irrigated areas had good practice of IYCF. Moreover, the study identified that ANC (AOR = 2.138, 95% CI: 1.085, 4.210), knowledge (AOR = 2.43, 95% CI: 0.275, 0.612), attitude (AOR = 1.687, 95% CI: 1.129, 2.520), PNC (AOR = 1.606, 95% CI: 1.154, 2.360) and women's decision making (AOR = 1.941, 95% CI: 1.305, 2.888) were significant predictors for IYCF among 0-23-months of age children.

**Conclusion:** The overall prevalence of infant and young child feeding practice in the study area was 62.5 percent, with significant differences between irrigated and non-irrigated areas. Infant and young child feeding practices are high as compared to previous studies. Women's decision making, ANC follow up, PNC follow up, attitude, and knowledge were identified as the intervention areas.

**Keywords:** Dangila district; Irrigated kebele; Non-irrigated kebele; IYCF practice

## Abbreviations

AMIYCN: Adolescent, Maternal, Infant, and Young Child Nutrition; ANC: Antenatal Care; CF: Complementary Feeding; EBF: Exclusive Breast Feeding; EDHS: Ethiopian Demographic and Health Survey; EIBF: Early initiation of Breast Feeding; EMDHS: Ethiopian Mini-Demographic and Health Survey; GDP: Gross Domestic Production; HSTP: Health Sector Transformation Plan; IYCF: Infant and Young Child Feeding; MAD: Minimum Acceptable Diet; MDD: Minimum Dietary Diversity; MDG: Millennium Development Goal; MMF Minimum Meal Frequency; NICU: Neonatal Intensive Care

Unit; NNP: National Nutrition Program; PNC: Postnatal Care; HH: Household

## Introduction

A collection of principles for establishing optimal infant and young child feeding practices in children aged 0 to 23 months is known as baby and young child feeding [1]. Early initiation of breastfeeding, exclusive breastfeeding, continuous nursing until the child reaches the age of two, and timely, adequate, and safe complementary feeding (CF) and consumption of iron-rich foods are all important markers of IYCF practice [2]. Breastfeeding should begin within one hour of

birth and continue exclusively throughout the first six months of a child's life, up to and including two years of age. Starting at 6 months, breastfeeding should be supplemented with age-appropriate solid, semi-solid, and soft food feedings [3]. Breast milk is a healthy food since it contains all of the essential nutrients as well as anti-infective components that prevent diarrhea and pneumonia [4]. To protect the newborn from disease and death, breastfeeding should begin within one hour of birth. Breastfeeding enhances an infant's immune system and may help them avoid chronic diseases later in life, such as obesity and diabetes. Breastfeeding also protects women from certain cancers and other illnesses. Appropriate feeding begins at six months of age and helps to prevent malnutrition as well as the spread of infectious diseases like diarrhea and pneumonia [3,5]. A infant who is not exclusively breastfed has a substantially higher risk of contracting diarrhea or pneumonia than one who is [3].

IYCF practice is a cornerstone of care for child development mentally and growth physically, but it is often under estimated. Failure to proper infant and young child feeding practice is associated with increased risks of child health. Such as childhood morbidity, mortality impaired motor, cognitive and behavioral development, slow physical growth, diminished immunity, reduced learning capacity and under-nutrition [6]. Poor nutrition leads to ill-health and ill-health contributes to further deterioration in nutritional status. 50-70% of the burden of diarrheal diseases, measles, malaria and lower respiratory infections was attributable to malnutrition [7,8].

According to the World Health Organization (WHO) and the United Nations International Children's Fund (UNICEF), newborns should be nursed exclusively for the first six months of their lives, with appropriate complementary feeding after that. Breastfeeding can be continued for up to two years or longer [9]. To encourage healthy feeding practices, the Ethiopian Ministry of Health (MOH) established the national nutrition program (NNP II) and the national guideline on adolescent, maternal, infant, and young child nutrition (AMIYCN). It has been decided to ramp up community-based nutrition programs and nutrition-sensitive activities. Increasing access to potable water and expanding medium and large irrigation projects, for example, could assist increase productivity and vary the foods produced throughout the year [10-12]. For example, extending medium and large irrigation projects and increasing access to potable water could help enhance output and diversify the foods produced throughout the year [10-12].

Ethiopia has witnessed encouraging progress in improving IYCF practice over the past decade by developing policies and strategies to support IYCF practice. However, IYCF practice remains so poor. Moreover under-nutrition is one of the main culprits causing high child mortality, accounting half of all childhood deaths in Ethiopia that the country must continue to make significant investments from nutrition again [12].

### Statement of the problem

Globally 10.6 million children under 5 years die every year. Of this mortality malnutrition accounts about 53% of deaths to under-fives children in developing countries [13]. Out of world's under-five children, 162 million stunted [14], 101 million underweight and 52 million were wasted [14]. Of the estimated 162 million stunted

children, 90 percent are found in Africa and Asia, one of which is Ethiopia. In Sub-Saharan Africa the prevalence of stunting, wasting and underweight were 57.7%, 18% and 28.8% respectively [15]. Similarly in Ethiopia, 37%, 7% and 21% of children under-five years were stunted, wasted and underweight respectively; while in Amhara stunting was 46% [4]. The magnitude also extends to study area stunting; wasting and underweight were 40.74%, 9.6% and 24.4% respectively [16].

The issue of IYCF practice is widespread; it is estimated that 50% and 34.8 percent of newborns are EIBF and EBF for the first 6 months of their lives, respectively. Complementary foods are sometimes introduced too early or too late, and they are frequently nutritionally deficient and dangerous [5,17,18]. Surprisingly, only 18% of children were fed a minimum acceptable diet (MAD), 28% were fed a variety of foods, and 55% were fed with a minimum meal frequency (MMF) [3]. It is well acknowledged that Africa has a large problem, with EBF, MMF, and MDD each accounting for 51%, 37-40%, and 40% of the total [7,19,20]. In Sub-Saharan Africa, less than 35%, 60%, and 18% of children aged 6-23 months satisfied the MDD, MMF, and MAD criteria, respectively [21]. In Ethiopia, 32.2% of newborn and young child feeding practices were adequate for all variables, but only 7% were appropriate supplemental feeding practices [7,22,23].

According to the 2019 Mini Demographic and Health Survey, EIBF and EBF were 73 percent and 59 percent, respectively, in Ethiopia (EMDHS).

According to the survey, only 7% of MAD sufferers and 14% of MDD sufferers. In contrast to WHO recommendations for IYCF, 14% of infants aged 0 to 5 months drink plain water and 13% drink complementary foods in addition to breast milk. Notably, only 6% of infants under the age of six months are breastfed at all. Only 9% of infants under the age of 6 months use a bottle with a nipple, a practice that is discouraged due to the risk of infecting the child [24].

WHO and UNICEF collaborated on the Global Strategy for IYCF Practice. It underlines the importance of healthy newborn and child feeding practices in increasing nutritional status and reducing infant mortality in all countries (9). Globally, malnutrition is being combated by implementing sustainable development goals. The National Nutrition Strategy (NNS) and the Health Sector Transformational Plan (HSTP) have been approved by Ethiopia's government to tackle malnutrition, particularly among children under the age of five. The Ethiopian government has vowed to end child malnutrition by launching the 'Seqota Declaration' [6]. Appropriate IYCF feeding has a fundamental importance for human survival, growth, development, health and nutrition to prevent morbidity and mortality significantly from under-five children [5,25]. It also improves nutritional status, which reduces poverty and stimulates economic growth to achieve health, education, employment goals and physical productivity of the labor force [26]. While poor IYCF practice is the principal proximate causes of malnutrition during the first two years of life. The cycle of early nutritional deficits are linked to malnourished girl child faces greater odds of giving birth to a malnourished and low birth weight infant when she grows up [1,12,27]. Globally, hunger and under nutrition reduce gross domestic product by US\$1.4-2.1 trillion a year and losing more than 10% of their lifetime earning potential, thus affecting national productivity [28,29]. The total annual cost of

under nutrition in Ethiopia was estimated at Ethiopian Birr (ETB) 55.5 billion, equivalent to 16.5% of Gross Domestic Product (GDP) [30]. Eliminating under nutrition in Ethiopia would prevent losses of 8–11% per year from the gross national product [31].

The low prevalence and poor practice of infant and young child feeding practice in most developing countries including Ethiopia are attributed to various socio-demographic, maternal and child health related factors. Such as residence, maternal age, age of the child, maternal occupation, educational status of mother, access to mass media, place of delivery, mode of delivery, knowledge, attitude, HH food security status, women's decision making and economic status. Those factors are associated with IYCF practice positively or negatively according to studies were identified [7,22,23,32-34].

Different literatures, governmental and non-governmental reports argue that, IYCF practice is not well practiced globally and nationally [9,35,36]. Even these realities in Ethiopia, there were few studies were conducted to identify the prevalence and associated factors among children less than 2yrs [32,37,38]. However, most of those studies were conducted in urban area, which is difficult to generalize the findings to rural area and comparative cross-sectional study designs were not implemented. Important variables like house hold food security and attitude were not included. More over the evidence in irrigated and non-irrigated area is scarce or limited. This indicates that, it has a long way to go to fill these gaps. Therefore, the aim of this study is to compare infant and young child feeding practice among 0-23 months of age in irrigated and non-irrigated area.

## Methods

### Study design and period

A Community based comparative cross-sectional study was conducted from Dec 1, 2020 to Jun 1, 2021.

### Study area and population

The study was conducted in Dangila district, which was found in Awi zone located 485 Km from the capital city Addis Ababa and 78Km from regional city Bahir Dar. In the district there were Amhara and Agew elites with a total projected population of 156169 in the year 2020. It is further divided into 6 sub clusters and 31 kebeles. In Dangila district, there are 1 primary hospital (governmental), 6 Health Centers and 31 health posts. The district childbearing age groups were 34825 of the total female population and under-five age groups were 21145 among these under-two years were 7808 [75]. Out of 31 kebeles, 10 kebeles were irrigation practiced and 21 kebeles were non-irrigation practiced.

### Source population

The source populations for the study were all mothers who had infant and young children 0-23 months of age residing in Dangila, Woreda.

### Study population

The study populations were all mothers who had infant and young children 0-23 months of age in the selected kebeles.

### Study unit

All selected mothers who had infant and young children 0-23

months of age in each selected kebeles.

### Inclusion criteria

Mothers who had infant and young children 0-23 months of age in the selected kebeles were included in the study.

### Operational definition of terms

**Irrigated area:** Areas where a practice to river diversion, pumping, and small or large dam's for agricultural cultivation during non-rainfall seasons in addition to rainfall seasons [76].

**Non-irrigated area:** Areas where agricultural cultivation practice is only during rainfall seasons [76].

**Appropriate IYCF practice/good:** Defined as early initiation of breast feeding within 1hr after delivery, exclusive breast feeding to infant age less than 6 months, continue breast feeding 1yrs and above, timely introduction of solid, semi-solid and soft foods in 6-8 months of age, minimum dietary diversity, minimum meal frequency, minimum acceptable diet and consumption of Iron rich foods. A practice that was appropriate for a specific age group received a score of 1, and a practice that was inappropriate received a score of 0. If summed score of the indicators is equal to 4 or above (above mean), it was considered as appropriate (good) IYCFP and If summed score of the indicators is equal to 3 or below (below mean), it was considered as inappropriate(good) IYCFP [2,23].

**Early initiation of breastfeed:** Proportion of children born in the last 23 months who were put to the breast within one hour of birth [77].

**Exclusive breastfeeding (EBF):** Means that an infant receives only breast milk from his or her mother or a wet-nurse, or expressed breast milk, and no other liquids or solids, not even water, with the exception of oral rehydration solution, drops or syrups consisting of vitamins, minerals supplements or medicines [5,77].

**Continued breastfeeding:** Continue breastfeeding for to 1yrs and above or more along with complementary feeding.

**Introduction of complementary feeding:** The process of introducing, solid, semi-solid or soft foods along with breast milk 6-8 months, when breast milk is no longer sufficient to meet the nutritional requirements of infants and young children [5].

**Minimum dietary diversity:** Proportion of children 6-23 months of age who receive foods from 4 or more food groups among the 7 food groups [77].

**Minimum meal frequency:** Proportion of breastfed and non-breastfed children 6-23 months of age who receive solid, semi-solid, or soft foods (but also including milk feeds for non-breastfed children. minimum frequency by age defined as: - 2 times for breastfed infants 6-9 months, 3 times for breastfed children 9-24 months and 4 times for non-breastfed children 6-24 months. In this study the maximum value 4 was taken to compute meal frequency [77].

**Minimum acceptable diet:** Proportion of children 6-23 months of age who receive a minimum dietary diversity and minimum meal frequency (apart from breast milk) [77].

**Consumption iron rich foods:** Proportion of children 6-23 months of age who receive iron rich foods [77].

**Knowledgeable of IYCF:** When the respondents correctly answer above mean of questions about IYCF knowledge [38].

**Less knowledgeable of IYCF:** When the respondents correctly answer below mean of questions about IYCF knowledge [38].

**Positive attitude about IYCF:** When the respondents agree to favorable questions to appropriate IYCF [38].

**Negative attitude about IYCF:** When the respondents disagree and don't know to favorable questions to appropriate IYCF [38].

**Wealth Index:** Is a composite measure of the cumulative living standard of a household.

**House hold food security:** A state in which "all people at all times have both physical and economic access to sufficient food to meet their dietary needs for a productive and healthy life". Measured by asking in the past four week's household food status using yes or no questions. 0 = No (skip to Q---) 1 = Yes (1 = rarely (once or twice in the past four weeks, 2 = Sometimes (three to ten times in the past four weeks, 3 = Often (more than ten times in the past four weeks).

Calculate the household food Insecurity access category for each household. 1 = Food Secure, 2=Mildly Food Insecure Access, 3=Moderately Food Insecure Access, 4=Severely Food Insecure Access [78].

**Women's decision making:** Participation of women's from HH decision making with their husband. In this study the measurement was by taking three No=0, yes=1 question from DHIS, among these questions the cumulative result=3 women's decision and 1, 2= no women's decision making.

### Sample size determination

Sample size estimation of the study followed two approaches considering the two objectives. For the first objective, sample size was calculated using double population proportion formula by considering the following assumptions: 95% confidence interval, 80% power, and prevalence IYCF practice in irrigated area ( $p_1$ ), prevalence IYCF practice in non-irrigated area ( $p_2$ ). The two comparison groups population ratio 1:1, prevalence of infant and young child feeding practice ( $p_2=43.4\%$ ) was taken from the previous studies done at North Achefer Woreda, Amhara, Ethiopia [38]. For irrigated area the prevalence of infant and young child feeding ( $p_1=53.4\%$ ) was taken to detect 10 % difference from non-irrigated area. Therefore,  $n_1=n_2=391$ , the group sample was 782 and using the correction formula, so the total sample size was 823 (including the 5% non-response rate).

### Sampling procedure

Dangila Woreda had a total of 31 kebeles. Stratified random sampling method was implemented to identify irrigated and non-irrigated kebeles. After stratification three kebeles from irrigated and six kebeles from non-irrigated were selected by using simple random sampling technic lottery method. Proportion to size allocation was used to determine the required sample size from each selected Kebeles. The sample was taken by using systematic simple random sampling technique from the list of infant and young children registration at health post. Finally select the study participants until that a total of 823 mothers who had infant and young children 0-23 months of age

fulfill.

### Instrument and data collection procedure

Questioner was prepared after reviewing different literature developed for similar purposes by different authors. The questioner was developed in English then translated in to local language (Amharic) and finally retranslated back to English to check its consistency. The questionnaire was containing socio-demographic and economic, house hold food security, Knowledge and attitude related factors and maternal, child health service related factors and women's decision making.

Data was collected by using face-to-face interview method. The data collection was conducted in a private and calm environment to ensure confidentiality. The data collectors were four diploma nurses and the supervisor was one health officer. A total of 30 days was taken for data collection period from Dec 8, 2020 to Jun 8, 2021.

### Data quality assurance

The quality of the data was ensured by using a well-designed questionnaire adapted from previous literature, EDHS, and various guidelines. The principal investigator also provided training for both data collectors and supervisors on the purpose of the study, data collection technique, and proper questioner filling for two days as another data quality assurance method. Pretesting was used to control data quality; pretesting was done on 5% of the samples in adjacent kebeles from Chara to check the quality of the questionnaire and the instrument prior to actual data collection with similar socio-demographic characteristics. Every day following data collection, the principal investigator reviewed questionnaires to ensure completeness of questions. Incomplete questionnaires were removed from consideration. The data collection process was closely monitored by the principal investigator and the supervisor. Before data entry, the completeness of the questioner was also checked, and the data was coded, entered, and stored in the computer using Epi-info data version 7, then exported to SPSS statistical software version 23.

### Data processing, analysis and presentation

Descriptive analysis was used in the study to describe the percentage and number of respondents by socio demographic characteristics and other relevant variables.

To investigate the relationship between independent variables and dependent variables, bivariate logistic regression analysis was performed on the independent variables, and their proportion and crude odds ratio were computed against the outcome variable to identify the factors that will be associated with the dependent variables.

Those variables with a p-value of 0.25 that showed an association with the outcome variables in the bivariate analysis were entered into the final logistic regression to control for potential confounders.

The Hosmer-Lemshow goodness of fit test was used to assess the model's fitness. To assess the strength of the association, an adjusted odds ratio (AOR) with a 95 percent confidence interval was calculated, and a P value less than 0.05 was considered significant.



## Results

### Socio-demographic characteristics

Among the 823 households visited, 802 respondents provided complete responses, with a response rate of 97.8 percent in irrigated areas and 96.11 percent in non-irrigated areas. 276 (68%) and 263

(66.4%) of study participants had children aged 6-23 months in irrigated and non-irrigated areas, respectively. The children's mean(SD) age was 10.61(6.1) months, and the mothers' mean age was 30.3 (6.2) years. In terms of mother's educational status, 213 (52.5%) and 182 (46%), respectively, of mothers in irrigated and non-irrigated areas had no formal education. Almost all of the participants

**Table 1:** Socio-economic and demographic characteristics of the respondents from irrigated and non-irrigated Area of Dangila Woreda, north-west Ethiopia, 2021 (n=802).

Characteristics	Kebele category code				Totally		P-value
	Irrigated Area (n=406)		Non-irrigated Area (n=396)		Frequency	%	
	Frequency	%	Frequency	%			
<b>Response rate</b>	406	98.7	396	96.11	802	97.4	
<b>Age of mother</b>							
<=25yrs	114	28.1	101	25.5	215	26.8	0.592
25-34 yrs.	104	25.6	98	24.7	202	25.2	
35 and above	188	46.31	192	48.48	385	48	
<b>Age of child</b>							
0-6months	130	32	133	33.6	263	32.8	0.637
6-23 months	276	68	263	66.4	539	67.2	
<b>Sex of child</b>							
Male	225	55.4	185	46.7	410	51.1	0.014
Female	181	44.6	211	52.28	392	48.9	
<b>Education of mother</b>							
No formal education	213	52.46	182	46	395	49.3	0.191
Primary and above	193	47.54	214	54	407	50.7	
<b>Occupation of mother</b>							
House wife	311	76.6	313	79	624	77.8	0.199
Merchant	16	4.2	10	2.53	26	3.2	
Farmer	43	10.6	50	12.26	93	11.6	
Other	36	8.6	23	5.8	59	7.4	
<b>Religion</b>							
Orthodox	395	97.3	391	98.74	786	98	0.306
Muslim	8	2	3	0.7	11	1.4	
Other	3	0.7	2	0.5	5	0.6	
<b>Educational status of husband</b>							
No formal education	162	39.9	128	32.3	290	38.8	0.177
Primary and above	215	53	242	61.1	457	61.2	
<b>Occupation of husband</b>							
Farmer	304	74.9	306	77.27	610	86.6	0.268
Merchant	36	8.8	30	7.57	66	9.4	
Other	18	4.43	10	2.52	28	4	
<b>Total family size</b>							
1-4	290	71.4	269	67.9	559	69.7	0.158
>4	116	28.57	127	32	243	30.3	
<b>Wealth index</b>							
Poor	82	20.17	125	31.6	207	25.8	0.0002
Medium	115	28.33	137	34.6	252	31.4	
Higher/rich	209	51.48	134	33.8	343	42.8	

in this study, 395 (98%) in the irrigated area and 391 (98.74%) in the non-irrigated area, were orthodox Christian followers. Wealth index status of households 209(51.48%) and 134(33.8%) had higher asset of household economy among irrigated and non-irrigated Areas, respectively (Table 1).

### Prevalence of infant and young child feeding

In this study, 802 participants provide feedback on infant and young child feeding practices (IYFS).

Three hundred and seventy-two percent of mothers in the irrigated area and two hundred and seventy-two percent of mothers in the non-irrigated area initiated breast feeding within one hour of delivery, respectively. In irrigated and non-irrigated areas, almost all (95.6 percent and 93.4 percent, respectively) continued breast feeding until 1 year and older. For the first six months, 259 (63.8%) of irrigated mothers and 229 (57.8%) of non-irrigated mothers exclusively breastfed. Participants included 234 (54.7 percent) in irrigated areas and 181 (40.3 percent) in non-irrigated areas who were

introduced to complementary feeding on time. In the irrigated area, the minimum dietary diversity was 161 (58.3 percent) and in the non-irrigated area, it was 68 (25.9 percent). Minimum meal frequency was 201 (72.8 percent) in irrigated areas and 116 (44.1 percent) in non-irrigated areas, and minimum acceptable diet was 124 (44.9 percent) in irrigated areas and 63 (24%). The overall IYCF practice score was 293 (72.2 percent) in irrigated areas and 208 (52.8 percent) in non-irrigated areas (Table 2).

### Maternal and child health service utilization

There were 385 (94.8%) and 370 (93.4%) ANC follow-ups among the 802 study participants in the irrigated and non-irrigated areas, respectively. Only 107 (27.8 percent) in irrigated areas and 73 (19.7 percent) in non-irrigated areas had four or more ANC visits, and 329 (85 percent) in irrigated areas and 312 (84.3 percent) in non-irrigated areas were counseled about IYCF practice during ANC visits. Almost all of the 388 (95.6%) in the irrigated area and 366 (92.4%) in the non-irrigated area were attending institutional delivery. The majority of participants, 276 (68%) in irrigated areas and 198 (50%) in non-

**Table 2:** Prevalence of infant and young child feeding of the respondents from irrigated and non-irrigated Area of Dangila district, north-west Ethiopia, 2021 (n=802).

Characteristics	Kebele category code				Totally		P-value
	Irrigated Area (n=406)		Non-irrigated (n=396)		Frequency	%	
	Frequency	%	Frequency	%			
<b>Initiation of BF within 1hr after delivery</b>							
No	101	25	126	31.8	227	28.3	0.029
Yes	305	75	270	68.2	575	71.7	
<b>Exclusive breast feeding</b>							
No	147	36.2	167	42.2	314	39.2	0.084
Yes	259	63.8	229	57.8	488	60.8	
<b>Continued breast feeding to 1yrs</b>							
No	18	4.4	26	6.5	44	5.5	0.185
Yes	388	95.6	370	93.4	758	94.5	
<b>Introduction of CF (n &gt;=6-23 months=276)</b>			(n >=6-23 months=263)				
No	125	45.3	157	59.7	282	52.3	0.001
Yes	151	54.7	106	40.3	257	47.7	
<b>Minimum dietary diversity (n &gt;=6-23 months=276)</b>			(n >=6-23 months=263)				
No	115	41.7	195	74.1	310	57.5	0
Yes	161	58.3	68	25.9	229	42.5	
<b>Minimum meal frequency (n &gt;=6-23 months=276)</b>			(n >=6-23 months=263)				
No	75	27.2	147	55.9	222	41.2	0
Yes	201	72.8	116	44.1	317	57.8	
<b>Minimum acceptable diet (n&gt;=6-23 months=276)</b>			(n >=6-23 months=263)				
No	152	55.1	200	76	352	67.3	0.0006
Yes	124	44.9	63	24	187	34.7	
<b>Consumption of iron rich foods (n &gt;=6-23 months=276)</b>			(n >=6-23 months=263)				
No	73	26.4	130	49.4	203	37.7	0.0001
Yes	203	73.6	133	50.5	336	62.3	
<b>Over all IYCF practice</b>							
Poor	113	27.8	188	47.5	301	37.5	
Good	293	72.2	208	52.5	501	62.5	

**Table 3:** Maternal and child health service related factors of the respondents from irrigated and non-irrigated Area of Dangila district, north-west Ethiopia, 2021 (n=802).

Characteristics	Kebele category code				Totally		P-value
	Irrigated Area (n=406)		Non-irrigated Area (n=396)		Frequency	%	
	Frequency	%	Frequency	%			
<b>History of ANC attendance</b>							
No	21	5.2	26	6.6	47	5.9	0.008
Yes	385	94.8	370	93.4	755	94.1	
<b>Time of first ANC starting (n=385)</b>			(n=370)				
1-4months of pregnancy	208	54	158	42.7	361	47	0.002
5 and above months	177	46	212	57.3	394	52.2	
<b>Number of ANC Follow up (n=385)</b>			(n=370)				
Once	44	11.4	55	14.9	99	13.1	0.0001
Two times	108	28.1	144	38.9	252	33.4	
Three times	126	32.7	98	26.5	224	29.7	
Four and above	107	27.8	73	19.7	180	23	
<b>IYCF counseling ANC follow up (n=385)</b>			(n=370)				
No	56	14.5	58	15.7	114	15	0.165
Yes	329	85.5	312	84.3	641	85	
<b>Place of birth</b>							
Health facility	388	95.6	366	92.4	756	94.4	0.006
Home	18	4.4	30	7.6	48	5.6	
<b>Birth attendant</b>							
Health professional	388	95.6	366	92.4	756	94.4	0.111
TBA	18	4.4	30	7.6	48	5.6	
<b>PNC follow up</b>							
No	130	32	190	47.8	320	39.9	0.0004
Yes	276	68	206	52	474	59.1	
<b>IYCF counseling during PNC</b>							
No	79	19.5	116	29.3	195	24.3	0.543
Yes	327	80.5	280	70.7	607	75.7	
<b>Multiple delivery</b>							
No	359	88.4	356	89.9	715	89.2	0.351
Yes	47	11.6	40	10.1	87	10.8	
<b>Birth order</b>							
First	56	14	36	9	88	11.6	0.275
Second and above	349	86	360	91	714	88.4	
<b>Birth space</b>							
2yrs. and above	294	72.4	282	71.2	576	71.8	0.08
Less than two yrs.	112	27.6	114	28.8	226	28.2	

irrigated areas, had PNC follow up (Table 3).

### Knowledge, attitude, household food security status and women's decision making

Based on knowledge score criteria, 261 (64.3 percent) of study participants in irrigated areas and 200 (50.5 percent) in non-irrigated areas were knowledgeable, with responses above the mean to knowledge assessment questions. Among the 802 study participants, 246 (60.6 percent) in the irrigated area and 183 (46.2 percent) in the

non-irrigated area had a favorable attitude toward infant and young child feeding practices. Household food insecurity was reported by 9 (2.2 percent) of participants in irrigated areas and 27 (6.8 percent) in non-irrigated areas. Women's decision power was only 28.3 percent in irrigated areas and 20.2 percent in non-irrigated areas (Table 4).

### Factors associated with IYCF practice in irrigated and non-irrigated area

During the bivariate logistic regression analysis, women's

**Table 4:** Knowledge, attitude, household food security status and women's decision making of the respondents from irrigated and non-irrigated Area of Dangila district, north-west Ethiopia, 2021 (n=802).

Characteristics	Kebele category code				Totally		P-Value
	Irrigated Area (n=406)		Non-irrigated Area (n=396)		Frequency	%	
	Frequency	%	Frequency	%			
<b>Knowledge of respondents</b>							
Less knowledgeable	145	35.7	196	49.5	341	42.5	0.00032
Knowledgeable	261	64.3	200	50.5	461	57.7	
<b>Attitude of respondents</b>							
Negative attitude	160	39.4	213	53.8	373	46.5	0.00001
Positive attitude	246	60.6	183	46.2	429	53.5	
<b>HH food security status</b>							
Food insecure	9	2.2	27	6.8	36	4.5	0.003
Food secure	397	97.8	369	93.2	766	95.5	
<b>Women's decision making</b>							
No	291	71.7	316	79.8	607	75.7	0.007
Yes	115	28.3	80	20.2	195	24.3	

**Table 5:** Factors associated with IYCF practice of the respondents from irrigated and non-irrigated Area of Dangila district, north-west Ethiopia, 2021 (n=802).

Characteristics	IYCF practice (n=802)				P-value
	Good	Poor	COR (95%CI)	AOR (95%CI)	
<b>Women's decision making</b>					
Yes	143(17.5%)	52(6.5%)	1.913(1.340, 2.731)	1.941(1.305, 2.888)	0.001**
No	358(44.6%)	249(31%)	1	1	
<b>ANC</b>					
Yes	485(60.5%)	270(33.2%)	3.480(1.870, 6.479)	2.138(1.085, 4.210)	0.0028*
No	16(2%)	31(3.9%)	1	1	
<b>Place of birth</b>					
At home	18(2.2%)	27(3.4%)	1	1	0.48
At health facility	483(60.2%)	274(37.5%)	0.378(1.430, 4.889)	0.495(1.006, 4.008)	
<b>Multiple delivery</b>					
Yes	35(4.4%)	52(6.5%)	0.360(0.228, 0.567)	0.352(0.215, 0.577)	0.34
No	466(58.1%)	249(31%)	1	1	
<b>PNC</b>					
Yes	334(41.1%)	140(17.8%)	2.30(1.716, 3.083)	1.606(1.154, 2.236)	0.005*
No	167(20.8%)	161(20.1%)	1	1	
<b>Attitude</b>					
Positive	325(40.5%)	104(13%)	3.498(2.591, 4.721)	1.687(1.129, 2.520)	0.011*
Negative	176(21.4%)	197(24.6%)	1	1	
<b>Knowledge</b>					
Knowledgeable	350(43.6%)	111(13.8%)	3.968(0.186, 0.341)	2.430(0.275, 0.612)	0.000012**
Less knowledgeable	151(18.8%)	190(23.7%)	1	1	

\*P value &lt;0.05; \*\*P value&lt;=0.001.

decision making, ANC follow up, place of birth, birth attendant, PNC follow up, total family size, multiple deliveries, attitude of mother, IYCF counseling, knowledge of respondent, HH food security status, educational status of respondent, and wealth index were candidates ( $p < 0.25$ ) for multivariable analysis among children aged 0 to 23 months. In contrast, the multivariate logistic regression analysis

revealed that women's decision making, ANC follow up, place of birth, PNC follow up, multiple delivery, mothers' attitude, and knowledge of IYCF practice were significantly associated with IYCF practice. Mothers who had ANC follow up were twice as likely to practice IYCF as mothers who did not have ANC follow up (AOR= 2.138, 95 percent CI: 1.085, 4.210). Mothers who were knowledgeable



**Table 6:** Factors associated with IYCF practice of the respondents from irrigated Area of Dangila District, north-west Ethiopia, 2021 (n=406).

Characteristics	IYCF practice (n=406)				P-value
	Good	Poor	COR (95%CI)	AOR (95%CI)	
<b>Women's decision making</b>					
Yes	91(22.4%)	24(21.9%)	1.671(0.999, 2.794)	1.844(0.945, 3.597)	0.073
No	202(5.9%)	89(21.9%)	1	1	
<b>Birth attendant</b>					
TBA	9(2.2%)	9(2.2%)	1	1	0.039*
Health professional	284(70%)	104(25.6%)	0.366(0.142, 0.948)	3.989(1.074, 14.818)	
<b>Attitude</b>					
Positive	208(51.2%)	38(9.4%)	4.830(3.035, 7.57)	0.549(0.271, 1.111)	0.0096*
Negative	85(20.9%)	75(18.5%)	1	1	
<b>Knowledge</b>					
Less Knowledgeable	71(17.5%)	74(18.2%)	1	1	0.00001**
Knowledgeable	222(54.7%)	39(9.6%)	5.933(3.704, 9.502)	5.061(2.465, 10.389)	
<b>Wealth index</b>					
Rich	134(33%)	75(18.5%)	0.368(0.194, 0.698)	0.219(0.090, 0.534)	0.001
Medium	91(24.9%)	24(5.9)	0.781(0.376, 1.620)	1	
Poor	68(16.7%)	14(3.4)	1	1	

\*P value &lt;0.05; \*\*P value&lt;=0.001.

**Table 7:** Factors associated with IYCF practice of the respondents from in non-irrigated Area of Dangila district, north-west Ethiopia, 2021 (n=396).

Characteristics	IYCF practice (n=396)				P-value
	Good	Poor	COR (95%CI)	AOR (95%CI)	
<b>Women's decision making</b>					
Yes	52(13.1%)	28(7.1%)	1.904(1.444, 3.171)	1.772(0.898, 3.261)	0.02*
No	156(39.4%)	160(40.4%)	1	1	
<b>ANC</b>					
Yes	201(50.8%)	169(42.7%)	3.228(1.325, 7.864)	2.535(1.013, 6.342)	0.047*
No	7(1.8%)	19(4.8%)	1	1	
<b>Multiple delivery</b>					
No	176(44.4%)	180(45.5%)	0.244(0.110, 0.545)	0.261(0.115, 0.96)	0.001*
Yes	32(8.1%)	8(2)	1	1	
<b>Knowledge</b>					
Less Knowledgeable	80(20.2%)	116(29.3%)	1	1	0.0002*
Knowledgeable	128(32.3%)	72(18.2%)	0.3879(0.259, 0.582)	0.400(0.263, 0.608)	

\*P value &lt;0.05; \*\*P value&lt;=0.001.

were 2.43 times more likely to practice IYCF than less knowledgeable mothers (AOR= 2.43, 95 percent CI: 0.275, 0.612). Mothers with a positive attitude practiced IYCF 1.687 times more than mothers with a negative attitude (AOR= 1.687, 95 percent CI: 1.129, 2.520). Mothers who received PNC follow-up were 1.606 times more likely to practice IYCF than mothers who did not receive PNC follow-up (AOR= 1.606, 95 percent CI: 1.154, 2.360). Mothers who participated in household decision making were 1.941 times more likely than mothers who did not participate in household decision making to practice infant and IYCF (AOR= 1.941, 95 percent CI: 1.305, 2.888) (Table 5).

#### Factors associated with IYCF practice in irrigated area

During the bivariate logistic regression analysis, women's

decision making, ANC follow up, place of birth, birth attendant, PNC follow up, total family size, multiple deliveries, mother's attitude, IYCF counseling, respondent knowledge, HH food security status, and wealth index were candidates ( $p < 0.25$ ) for multivariable analysis among children aged 0 to 23 months.

In contrast, the multivariable analysis revealed that women's decision making, birth attendant, mother's attitude, mother's knowledge, and wealth index were significantly associated with infant and young child feeding practice. Mothers who participated in household decision making were 1.844 times more likely to practice IYCF (AOR= 1.844, 95 percent CI: 0.945, 3.597) than mothers who did not participate in household decision making. Mothers who had a health professional as their birth attendant were 3.989 times more

likely to practice IYCF (AOR=3.989, 95 percent CI: 1.074, 14.818) than mothers who had a traditional birth attendant.

Positive attitude mothers are 0.549 times more likely (AOR= 0.549, 95 percent CI: 0.271, 1.111) to practice IYCF than negative attitude mothers. Knowledgeable mothers were 5.061 times more likely (AOR= 5.061, 95 percent CI: 2.465, 10.389) to practice IYCF than less knowledgeable mothers. Rich mothers were 0.219 times more likely (AOR= 0.219, 95 percent CI: 0.090, 0.534) to practice infant and young child care than poor mothers (Table 6).

### Factors associated with IYCF practice in non-irrigated area

During the bivariate logistic regression analysis; women's decision making, ANC follow up, place of birth, birth attendant, PNC follow up, total family size, multiple deliveries, attitude of mother, IYCF counseling, knowledge of respondent, were candidates ( $p < 0.25$ ) for multivariable logistic regression analysis among 0-23 months of children.

Whereas, the multivariable logistic regression analysis revealed that women's decision making, ANC follow up, multiple delivery and knowledge of mothers were significantly associated to infant and young child feeding practice. Mothers who had participating at household decision making has 1.772 times more likely (AOR= 1.772, 95% CI: 0.898, 3.261) practicing IYCF than mothers who had no participating at household decision making. Mothers who had no multiple delivery has 0.261 times more likely (AOR= 0.261, 95% CI: 0.115, 0.96) practicing IYCF than mothers who had multiple delivery. Mothers who had ANC follow up has 2.535 times more likely (AOR= 2.535, 95% CI: 1.013, 6.342) practicing IYCF than mothers who had no ANC follow up. Mothers who were knowledgeable has 0.4 times more likely (AOR= 0.400, 95% CI: 0.263, 0.608) practicing IYCF than mothers who were less knowledgeable (Table 7).

## Discussion

The findings of this study revealed that two-thirds of respondents (75 percent in irrigated areas and 68.2 percent in non-irrigated areas) initiated breast feeding within one hour of delivery, which was higher than studies conducted in the Kingdom of Saudi Arabia (43 percent) [44] and Nigeria (34.7 percent) [47]. The preference for health-care delivery and skilled birth attendants leads to the possibility of early breast-feeding initiation by health-care professionals.

It could also be health-care performance, socio-cultural barriers, and the mother's knowledge of when to begin breast-feeding after delivery.

The findings of this study, on the other hand, were consistent with EDHS survey analysis in Ethiopia (74.3 percent) [51] and a study conducted in Assella town (70%) [56].

It is possible that the government's focus and commitment to child health and nutrition throughout the country is similar, with a dramatic increase in skill delivery. This may allow for the possibility of starting breast feeding within 1-hour of delivery. More than half of the respondents (63.8 percent) in irrigated areas and 57.8 percent in non-irrigated areas exclusively breastfed their children for the first six months, even without access to water.

It was higher than in studies conducted in Somaliland (20.47%)

[49], Bishoftu (34.1%) [55] and East Gojam at Motta (50.1%) [57].

The disparity in this result could be attributed to socioeconomic differences and cultural practices among study subjects in different parts of Ethiopia. However, this figure is lower than that found in the Assella town studies (86.3 percent) [56]. It could be because those who live in cities have better access to health care and media exposure to learn about breast feeding than those who live in rural areas. Breast feeding continued to 1-year and above was 95.6 percent in irrigated areas and 93.4 percent in non-irrigated areas, which is higher than the Jima study (75.6 percent) [54].

The majority of the participants in this study were housewives, which could increase the likelihood of their child breastfeeding because it costs less when they have a low economic status and they spend much of their time at home, which increases the likelihood of continuing to breastfeed. In addition, mothers in urban areas may have a heavy workload, so they may stop breast-feeding early and switch to formula milk instead of breast milk. Because urban mothers have better economic assets than rural mothers, mothers in urban settings substitute breast milk with commercially produced formula milk, cow milk, and other commercially available foods because they are more easily accessible and affordable.

In this study, the timely introduction of complementary feeding at 6 months and above was found to be (54.7 percent) in irrigated areas and 40.3 percent in non-irrigated areas, which was similar to a study conducted in two Ethiopian agro-ecological zones (50.5 percent) [52]. On the contrary, it was lower than in studies conducted in India (72.7%) [42], Addis Abeba (81.1%) [53], and Jima (82.9%) [54]. This could be due to differences in socioeconomic status, cultural practices, accessibility of children's food items, and nutrition action intervention from the ministry of health to health professionals, such as health extension program implementation in Ethiopia. Another reason could be that different parts of Ethiopia have different levels of awareness, economic status, health service accessibility, and performance, all of which have an impact on IYCF practice.

In similar ways, the minimum dietary diversity was 58.3 percent in irrigated areas and 25.9 percent in non-irrigated areas, which was higher than studies done in Northern India (29.6 percent) [43] and Kenya (32-40 percent) [48], Shashemene 16.1 percent [23,53], EDHS 2016 survey analysis (14.9 percent) [52] and Assella town (26.6 percent) [56].

This fact could be the result of a study that includes irrigated land, allowing a variety of food groups to be easily accessible and improving or growing household economic status in order to feed diversified foods. Another reason could be that path finder's from the study area helped to optimize the health extension program and community-based neonatal care implementation.

As a result of these facts, the minimum dietary diversity increases. In irrigated areas, the minimum meal frequency was 72.8 percent, while in non-irrigated areas it was 44.1 percent. The minimum acceptable diet was 44.9 percent in irrigated areas and 24 percent in non-irrigated areas, which was lower than in previous studies in India (45.8) [42] and Addis Abeba (65.1 percent) [53]. The minimum acceptable diet was higher than in India (19.5%) [42] and Ethiopia's two agro-ecological zones (12%) [52]. This disparity could

be attributed to differences in irrigation schemes, socioeconomic practices, and cultural practices between the country and the study setting.

The overall prevalence of infant and young child feeding practice in this study was 72.2% (95% CI: 67.5%, 76.1%) in irrigated areas and 52.5% (95% CI: 47.8%, 57.4%) in non-irrigated areas. Of that total, 62.5% (95% CI: 59.1, 65.8%). This study's findings outperform those of Shashemene (32.2%), North Achefer (43.4%), and South Wollo Zone (45.5%) [58]. The deference might be due to the study setting, including an irrigated area that enhances the diversified foods and economic assets of the household. In addition to this, it might be the level of health service and, time gap between the study period and socio-economic support that make the difference between study areas.

In this study the prevalence of IYCF practice had statistically significant variation among 0-23 months of age children. The possible explanation for this significance variation might be due difference of household wealth index status in irrigated and non-irrigated area. It may be happening due to irrigation scheme, since irrigation increases productivity in addition to non-rainfall season. Beside to this economically improved community has increased health seeking behavior and uptake of health services, so mother's in irrigated area had most likely child health service than mothers' in non-irrigated area to enhances IYCF practice. The other reason for the difference might be mothers in irrigated area can easily accesses variety of food items due to opportunity of production by irrigation or purchasing than non-irrigated area. This an advantage to enhances timely introduction of complementary feeding, increases minimum dietary diversity, minimum mealy frequency and minimum acceptable diet results to improving IYCF practice in irrigated area than in non-irrigated area. Another issue for the difference might be mothers in irrigated may have frequent health facility visit, which enables to gaining IYCF related information's at health facility and better media accesses. This may intern increases mother's knowledge and attitude towards IYCF practice, which has better infant and young child feeding practice again [6].

A significant association was observed between mothers' participation on household decision making and good IYCF practice in both irrigated and non-irrigated area. The prevalence of IYCF practice was significantly higher among those who had women's decision making as compared to those who do not women's decision making. The possible explanation might be mothers who have participating on household decision making can get free time to feed their child and can purchase easily foods which are not available in the household. In addition to this, mothers who had participation on household decision making have freedom to visit health facilities for child health service with IYCF education. These opportunities are used as input to achieve or to have good IYCF practice. This finding was supported with the previous studies conducted in south Ethiopia [71].

ANC follow up has significantly associated with infant and young child feeding practice. It could be due to, mothers who had ANC follow up has a chance to gain health worker counselling and education about IYCF practice and participating cooking demonstration during ANC follow up. Pregnant and lactating mothers conference has key

messages about IYCF practice during their ANC follow up. The same result was observed from the previous study conducted in Assella [56], and Gondar town [64].

In this study PNC follow up was associated with infant and young child feeding practice among 0-23months of age children. Mothers who had PNC follow up are receiving information to breast feeding, complementary feeding and diversified foods within cooking demonstration. Beside to this, health professionals may show practical demonstrations and role models for breast feeding and complementary feeding. Furthermore, it might be the strength of health extension worker implementation to maternal health service packages including postnatal service. This finding is supported by previous studies conducted in Assella [56], Shashemene [23].

Knowledge and attitude were significantly associated to infant and young child feeding practice. Mothers who were knowledgeable and mothers who had positive attitude were more likely practice infant and young child feeding practice. This might be those mothers having information and understanding about the issue of IYCF components can have a better chance of good IYCF practice. The same is true mothers who have positive inclination toward IYCF have a chance to increase IYCF practice. This result is supported by the previous studies conducted in Saudi Arabia [44], Uganda [45], in North west Ethiopia [71] and in Kenya [48,71].

An association was observed between wealth index and good infant and young child feeding practice among 0-23 months of age children in irrigated area. Mothers who are rich have good infant and young child feeding practice than mothers who were poor. This finding is true, because irrigation by itself has an advantage for economic growth; this reality makes to have better nutrition. This result is evidenced by the previous study conducted in Wollo Zone, EDHS, 2016 analysis, Gondar town north Achefer district [38,58,64,66].

In irrigated area skill birth attendant has a significant association to good infant and young child feeding practice. Mothers who hand skilled birth attendance have good IYCF practice than those who had traditional birth attendant. This fact might be in irrigated area four and above ANC follow up were higher than in non-irrigated area. This frequent health facility visits enables adherence with maternal health services and health professionals leading to enhance skill delivery. During skill birth attendance facilitating early initiation of breast feeding, counseling about IYCF practice, informing the bad effects of pre-lacteal feeding and all child health services by skill birth attendant. The above justification is coinciding with the previous study conducted in Shashemenie, Assela Town, Hawassa [23,56,64-66].

Between multiple delivery and infant and young child feeding has significant association in non-irrigated area. Mothers who had single delivery has better infant and young child feed than mothers who had multiple delivery. It is clear that, economic cost to purchase formula milk, burden of work, to have child health service like immunization, feeding and giving care for single child is easier.

## Conclusion

The prevalence of infant and young child feeding practice among 0-23 months of age children was (62.5%) in the study area and had

shown significant variation between irrigated and non-irrigated area. Infant and young child feeding practice is high as compared to studies conducted in different part of Ethiopia among 0-23 months of age children. Women's decision making, ANC follow up, PNC follow up, attitude of mother/care giver and knowledge of mothers or care giver were identified as significant predictors of infant and young child feeding practice among 0-23 months of age children in the study area.

## Recommendation

The district health office should give attention to improving ANC follow-up and postnatal follow-up services with strict IYCF counseling. The districts should also give strong emphasis on health promotion and awareness creation to mothers who have 0-23 months old children to gain knowledge and a positive attitude in order to practice IYCF. The district agricultural office gives great attention to extending irrigation schemes for non-irrigated areas. Families and communities would be encouraged to focus on the issue by understanding the components of IYCF and practicing according to health worker recommendations in order to improve infant and young child feeding practices. The families also take in information about IYCF from nearby women's development army, health extension workers, and health workers. The families and communities should also attend cooking demonstrations, which are demonstrated by the women's development army and by health extension workers at the health post to improve IYCF practice. The low prevalence of IYCF can be improved through providing training for health professionals, including health extension workers, about IYCF so as to make it part of their routine work from pregnancy till months of age. The health promotion for IYCF must be given at community level and health facility level for mothers starting from pregnancy to 23 months of age because this is a critical period for child development and growth. Therefore, reasonable resources should be allocated for health promotion to improve IYCF. And it needs to conduct research, including cultural and behavioral factors.

## Conclusion

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**Availability of data and materials:** All the important data are present in the corresponding author and you can request and get it.

**Contributions:** MB is the pioneer to draft the manuscript. WM & MT are research assistant who has been actively engaged in each step in the research process. MB, WM & MT was involved in the conception and design of the whole research. MB, WM & MT is involved in the design and interpretation of findings. All authors have read and approved their ownership the manuscript.

**Ethical consideration:** A letter of ethical approval was obtained from the Institutional Review Board (IRB) of Bahir Dar University, College of Medicine and Health Sciences. Furthermore, before the data collection, a formal permission letter was obtained from the Dangila administrative council and health office. Before data collection, all participants were asked to give verbal informed consent. Before starting the interview, the data collector explained the purpose of the study to all the participants, confirming the confidentiality of their information that it would never be used for purposes other than

scientific research. Participation in the study was voluntary and the autonomy of participants was respected. Participants were informed that participation was voluntary and that if they felt discomfort during the interview, they could stop at any time.

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