

Knowledge, Attitude, and Practice of Pregnant Mothers regarding Exercise during Pregnancy in Mothers Attending ANC at selected Health Facilities Addis Ababa, Ethiopia, 2021.

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Abstract

Background: Physical activity and exercise are orchestrated bodily movements produced by the contraction of skeletal muscles, at the expense of energy expenditure, in all phases of life including pregnancy that help maintain the health of an individual. Worldwide, the rate of physical inactivity during pregnancy is highly variable and tends to be more frequented in the third trimester of pregnancy. In Ethiopia, little is known and only limited literature is available concerning the physical activity status and associated factors among pregnant women.

Objective: To assess knowledge, attitude, practice, and its associated factors regarding exercise during pregnancy in women attending antenatal care at selected health centers found in Addis Ababa, the capital city of Ethiopia.

Methods: Facility based cross-sectional study designs were used in Addis Ababa City Administration selected public health centers. The study participants were selected by using simple random sampling technique, and a total of 806 pregnant women who have ANC follow up were enrolled. The data were collected by means of structured questionnaires. The data were entered, coded and analyzed using Statistical Package for Social Science (SPSS) version 25. Descriptive statistics of the collected data were performed for most variables such as socio-demographic, obstetric and health behavioral variables in the study using standard statistical parameters for percentage, means and standard deviation. To identify the factors associated with Knowledge, Attitude and Practice (KAP) as related to Antenatal Exercise (ANEx), bivariate and multivariate logistic regression analyses were performed. Variables with P value < 0.025 during the bivariate analysis were included in the multivariate analysis to see the effect of confounding factors. Odds ratio with 95% confidence intervals and statistical significance of P < 0.05 were considered. Inclusion criteria: All pregnant women in their third trimester and who were well informed and consenting without due coercion, inducement or harm if otherwise and having resided in Addis Ababa for the last six months.

Exclusion criteria: Those who declined to participate and did not fulfill the inclusion criteria.

Results: A total sample of 806 mothers who had ANC follow up was included in the study with a response rate of 100%. The rates of KAP of ANEx were 50.4%, 27.9% and 22.3% respectively. Among the total variables which were included in the analysis, eight variables that included age of the mothers, mother's educational status, heard about ANEx, source of information about ANEx, home activity of mothers, those mothers who had pre-pregnancy exercises, who had poor knowledge and who had negative attitude towards ANC exercise showed positive association with KAP of ANEx among all the pregnant women.

Conclusions: The findings of this study suggest that knowledge concerning antenatal exercise is comparable and reasonably favorable; their attitude and practice of ANC exercise is low in comparison with the different recommended guidelines. However, very few Ethiopian pregnant women practice ANEx according to the usual recommended guidelines during pregnancy.

Recommendation: There is strong need for an affirmative awareness creation among pregnant women within the comprehensive ANC services, popularization and inclusion of the service providers, program managers and eventually pave the way forward for the development or adoption of a guideline for an engaging and gauged physical activity during pregnancy.

Keywords: Antenatal exercise, KAP study, Addis Ababa, Ethiopia

Introduction

Physical activity is a coordinated bodily movement brought about by the contraction and relaxation of involved skeletal muscles in all walks of life in general and pregnancy in particular and it is to be noted that physical exercise is in principle scheduled, set program or type specifics of repetitive intentional movements that ensure the wellbeing of individuals and the pregnant including the unborn fetus. In this context, both are used interchangeably though mainly implying the latter. WHO and American College of Sports Medicine (ACSM) have issued evidence-based recommendations indicating that the beneficial effects of exercise in most adults are indisputable and that the benefits far outweigh the risks. Since 2002, several publications, ACOG guidelines and multiple researchers have reported the benefits of exercise in a variety of formats for the mother, fetus, and eventually to the child [1, 2].

Providing comprehensive antenatal care helps to have a safe motherhood or positive pregnancy experience; and these include risk identification, prevention and management of pregnancy-related or concurrent diseases and provide health education and health promotion [1]. One of the health promotion and preventing pregnancy related complications is physical exercise during pregnancy [2, 3]. In the absence of obstetric or medical complications or contraindications physical activity in pregnancy is safe and desirable. Moreover, pregnant women should be encouraged to continue or initiate and engage in safe physical activities. In women who have obstetric or medical comorbidities, exercise regimens should be highly individualized and tailored accordingly [4].

Growing evidence showed that participating in exercise during pregnancy reduces the risk of pregnancy related complications like preeclampsia and gestational diabetes mellitus and shorten the duration of labor, palliate low back pain and allay antenatal and postnatal depression. Furthermore, it is noted to lead to decreased rate of cesarean section and operative vaginal delivery and mitigate delivering a macrosomic baby [2-5].

Pregnancy is a critical period in a woman's life characterized by different immune-metabolic responses depending on the trimester of the pregnancy [6]. The fluctuations in these inflammatory responses are essential for adequate fetomaternal homeostasis and thus serve as a prerequisite for a healthy and term pregnancy [7]. Nonetheless, dysregulation of pro and anti-inflammatory cytokines might lead to a higher risk of developing pregnancy complications. In this regard, exercise might be a promising clinical tool to modulate inflammatory responses and prevent complicated pregnancies [8].

The WHO recommends that people get engaged in physical activity for at least 600 metabolic equivalent minutes (MET minutes) which amounts to 150 minutes per week of brisk walking or weekly 75 minutes of running. The Centers for Disease Control and Prevention (CDC), American College of Sports Medicine (ACSM) adopted this recommendation for pregnant women and advised engagement in 30 min of moderate exercise per day on most days of the week, equivalent to 7.5 MET-h/weeks. The rates of physical inactivity of women who did not achieve the minimum physical activity recommendation during pregnancy range between 64.5 and 91.5%, and tend to be higher in the third trimester of pregnancy [9-14].

Several studies including a systematic review study showed that low levels of physical exercise in pregnancy are prevalent in

developing and to a certain extent in developed countries. This may be due to multitudinal factors like lack of information or counseling, awareness about benefit of antenatal exercise and inadequate knowledge of physical exercise during pregnancy. Likewise, in Ethiopia, the subject has not been broadly popularized though more frequented by the relatively educated and economically better of elites. Little is known concerning the physical activity status and associated factors (maternal weight control and fitness, alleviating pregnancy-related pain and psychological symptoms) among pregnant women. A study conducted in Jimma Ethiopia by Hjorth et al. revealed that 76.4% of the pregnant women surveyed reported spending most of their time doing sedentary activities, including eating, sitting, sleeping/resting in bed and cooking as opposed to the South African study of only 46% rate of inactivity [15, 16].

Therefore, this study aims to assess knowledge, attitude, practice towards antenatal exercise and its associated factor of pregnant women attending antenatal care in Addis Ababa to produce data which would be potentially useful in generating previously unavailable data on the level of physical activity during pregnancy, upon which policy makers and NGOs may use this study as baseline for future planning and public health interventions of appropriate strategies to prevent pregnancy comorbidities and promote maternal and fetal health and wellbeing.

Materials and Methods

The study was conducted at health centers of Addis Ababa that are selected by multi-stage stratified sampling technique. Addis Ababa is the capital city of Ethiopia with a total area of 540 square kilometers. Based on the 2007 national census conducted by the Central Statistical Agency of Ethiopia (CSA), Addis Ababa has a total projected population size (PPS) of 3,435,028 in 2016 and is divided into ten sub-cities. The sub-cities are also divided into Woredas and a total of 116 Woredas are found in the city administration [17].

This institutional based cross-sectional descriptive study design was employed from January 2021 to June 2021 GC. The source population was all pregnant women who came for Antenatal Care follow up at the mentioned health centers in Addis Ababa and fulfilled the inclusion criteria of being informed, consenting without coercion or inducement, residing in Addis Ababa for the last six months and who are in the third trimester of pregnancy.

The sample size (SS) was determined using single proportion formula. The study considered the proportions of pregnant women with the prevalence of the exercising mothers to be 50%. In order to have a large sample size and to identify predictors, different socio-demographic characteristics with other study and to have good generalizability, 5% marginal error with 95% confidence interval and 10% non-response rate were added. The total sample required was calculated to be 384 and by using design effect and the total sample size was then reached at 806 and is summarized hereunder. A multi-stage stratified sampling technique (SSS) was applied to select the study subjects.

The ten administrative sub-cities were stratified into three groups as highest, medium and lowest score based on socio-economic indicators obtained from the Ethiopian household consumption expenditure survey 2016 [18]. One study area was selected by random sampling from each stratum. Among the three selected sub-cities the proportion of study population was calculated based on the number of health center and the sub-cities they have. From each selected sub-cities three health centers were

selected by Simple Random Sampling (SRS) technique and after calculating the sample size (SS), the sample of study population allocated by using probability proportional (PP) to their flow of pregnant mother who came for antenatal follow up was determined as presented in the schematic outline.

The dependent variables included knowledge, attitude and practice of exercise during pregnancy among the pregnant women who have ANC follow up. Of the independent variables mainly focusing on socio-economic characteristics were considered age, religion, educational level, occupation, monthly income, employment and marital status as well as pregnancy and obstetrical history (gravidity, parity, gestational age status, number of children and history of miscarriage). Awareness of the source of information both formal and informal pre-pregnancy regular physical exercise experience was also featured.

Data were collected between January and July 2021 through interviewer-guided structured questionnaire. Information was gathered by using structured questionnaires, which was adapted and modified from the study conducted in Nigeria, India and Zambia on similar topic [19-21]. The questionnaire items were tested and retested and that finally yielded an agreement percentage that ranged from 87.4 to 99.6% and the interclass coefficient was 0.985. The questionnaires were first prepared in English then translated into Amharic and translated back to English to maintain its consistency and pretested. The questionnaires had six parts: the first two parts were composed of socio- demo-

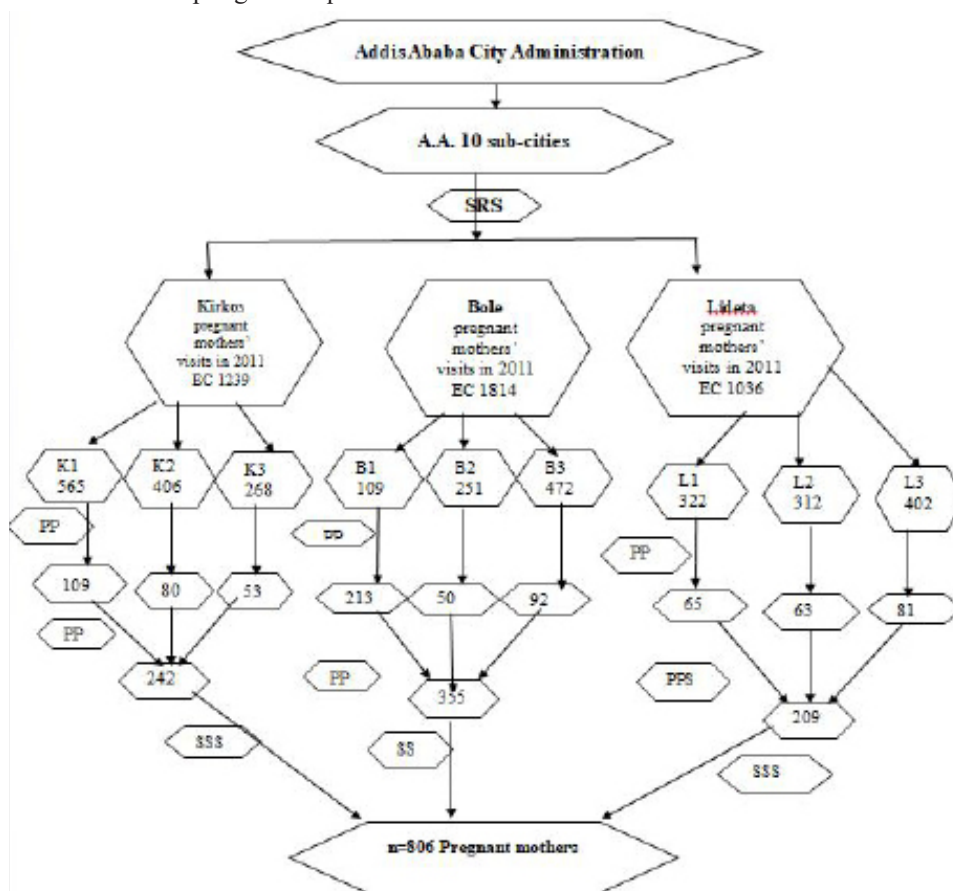
graphic characteristics and obstetrical history that included 14 questions; and third part concerning awareness had 4 questions, the fourth part dealing with knowledge had 16 questions (benefits and contraindications) of antenatal exercise with alternative response of Yes, No and I don't know. The final two parts included 8 attitude questions with alternative response Yes/No and 6 questions on practice of antenatal exercise.

A formal training and instruction to the data collectors and supervisors was in place and the data collection process was scrutinized for consistency and completeness. Then both the questionnaires and the variables were coded and SPSS version 25 was used to enter, clean and analyze the collected data.

An ethical clearance was obtained from the College of Health Sciences, School of Medicine of the Addis Ababa University Institutional Review Board. A permission letter for doing research and collecting data also were obtained from Black Lion Specialized Teaching Hospital.

An informed consent was obtained from each of the respondents. All measures to maintain human rights including the right to participate in the study or to withdraw from the study, right to privacy and confidentiality and right to prevention from any type of harm were taken into consideration. The data collected from the participants, were only used as an input for this research purpose.

Schematic representation of sampling technique



Results

A total of 806 pregnant mothers who were recruited for interview consented to participate in the study with a response rate of 100%. More than half (68%) of the respondents' age was found

to be in the range of 20 – 35 years old and 84.6% were married. More than a third of the respondents 338 (41.9%) belong to the income level group of 3000- 5000 ETB (Table 1).

Table 1: Socio-economic characteristics of pregnant women attending ANC clinic at selected health centers, Addis Ababa, 2021(n=806).

Variables	Category	Frequency	Percent (%)
Age of mothers	< 20	47	5.8
	20 – 34	548	68
	≥ 35	211	26.2
Marital status	Married	682	84.6
	Unmarried	56	6.9
	Others	68	8.4
Education	Illiterate	99	12.3
	Read and write	101	12.5
	Primary	124	15.4
	Secondary	239	29.7
	Certificate and above	243	30.1
Occupational status	G. employ	408	50.6
	Hose wife	197	24.4
	Owen business	191	23.7
	Others	10	1.2
Home activity	Nothing	127	15.8
	Cooking	389	48.3
	Looking after kids	199	24.7
	Others	91	11.3
Family monthly income in ETB*.	< 1000	67	8.3
	1000 – 3000	138	17.1
	>3000 – 5000	338	41.9
	> 5000	263	32.6
*ETB: current bank exchange rate is 1 USD = 48 Ethiopian Birr			

Concerning obstetric characteristics, half of the respondents (51.4%) were multigravida and 40.7% were multiparas; and 360 (44.7%) of them were in their 7 to 8 months of pregnancy gestational ages and 88 (10.9%) of them had history of abortion (Table 2).

Table 2: Obstetrical characteristics of pregnant women attending ANC clinic at selected health centers, Addis Ababa, Ethiopia, 2018 (n=806).

Variables	Category	Frequency	Percent (%)
Gravidity	1	294	36.5
	2 – 4	414	51.4
	≥ 5	98	12.2
Parity	Have no	294	36.5
	1	116	14.4
	2 – 4	336	41.7
	≥ 5	60	7.4
No. of alive children	None	304	37.7
	1	105	13.0
	2 – 4	352	43.7
	≥ 5	45	5.6
History of abortion	Yes	88	10.9
	No	718	89.1
Gestational age of current pregnancy	>28 – < 37 weeks	360	44.7
	>37 - 40 weeks	268	33.3
	>40 weeks	178	22.1

From the total respondents, 294 (36.5%) had history of pre-pregnancy physical exercise, and 41.8% heard about ANC exercise. Their source of information were health professionals, family/

friends and mass media accounting for 20 (2.5%), 142 (17.6%), 180 (22.3%), respectively (Table 3).

Table 3: Awareness of antenatal exercise among pregnant women attending ANC clinic at selected health centers, Addis Ababa, Ethiopia, 2021.

Variables	Category	Frequency	Percent (%)
History of pre pregnancy exercise	Yes	294	36.5
	No	512	63.5
Heard about ANC exercise	Yes	337	41.8
	No	469	58.2
Types of exercise heard by pregnant women	Walking	63	18.7
	Aerobics	6	1.8
	Breathing technique	16	4.7
	Pelvic floor exercise	4	1.2
	Back exercise	2	0.6
	Ankle and toe	12	3.6
	≥ 2 of the above	234	69.4
Source of information	Health professional	20	5.9
	Family/friends	142	42.1
	Mass media	180	53.4

Those recruits who correctly identified that antenatal exercise can decrease back pain, prevents excessive weight gain and increase energy and stamina during pregnancy accounted for 67.1%, 70.1% and 55%, respectively. Furthermore, 50%, 26.1%, and 68% of the respondents pointed out that ANEx helps cope with labor and delivery pain, decrease risk of having gestation-

al diabetes mellitus and high blood pressure during pregnancy, respectively. The computation of the overall knowledge questions of the participants yielded a mean value of 1.6879 with S.D ±0.59935. Therefore, regardless of knowledge of ANEx summary index below, half of the respondents 406(50.4%) were knowledgeable about the antenatal exercise (Table 4).

Table 4: Knowledge about the benefit and contraindication of antenatal exercise among pregnant women attending ANC clinic at selected health centers, Addis Ababa, Ethiopia, 2021 (n=806).

Variables	Categories	Frequency	Percent (%)
Exercise decreases back pain during pregnancy	Yes	541	67.1
	No	97	12.0
	I don't know	168	20.8
Exercise decreases excessive weight gain during pregnancy	Yes	565	70.1
	No	65	8.1
	I don't know	176	21.8
Exercise increases energy and stain during pregnancy	Yes	443	55.0
	No	121	15.0
	I don't know	242	30.0
Exercise helps cope with labor and delivery pain	Yes	403	50.0
	No	161	20.0
	I don't know	242	30.0
Exercise decreases high sugar level during pregnancy	Yes	210	26.1
	No	72	8.9
	I don't know	524	65.0
Exercise helps to control blood pressure during pregnancy	Yes	548	68.0
	No	81	10.0
	I don't know	177	22.0
Exercise helps more to rapid postnatal recovery	Yes	677	84.0
	No	32	4.0
	I don't know	97	12.0
Knowledge of mothers about ANC exercise	Good	406	50.4
	Poor	400	49.6

Regarding the attitude assessment questions, about 50 percent of the respondents thought that physical exercise during pregnancy prevent antenatal and postnatal depression. More than half of the pregnant women (54.1%) felt that physical exercise during pregnancy is contraindicated for women with poorly controlled

GDM and in 90% for women with APH. The respondent's attitude score was with a mean of 1.4785 and SD + 0.23390. Of the total respondents, 225 (27.9%) had favorable attitude towards antenatal exercise (Table 5, Figure 1).

Table 5: Percentage distribution about attitude of antenatal exercise among pregnant women attending ANC at selected health centers in Addis Ababa, Ethiopia, 2021 (n=806).

Variables	Categories	Frequency	Percent (%)
Exercise prevent AN and PN depression	Yes	403	50
	No	161	20
	I don't know	242	30
Exercise aid for better fetal wellbeing	Yes	395	49
	No	250	31
	I don't know	161	20
Exercise contraindicated for women with APH	Yes	715	90
	No	81	10
Exercise not advised for laboring mothers	Yes	758	94
	No	48	6
Exercise contraindicated for women with chest pain	Yes	758	94
	No	48	6
Exercise contraindicated for women with breathing problem	Yes	758	94
	No	48	6
Exercise contraindicated for women with premature labor	Yes	758	94
	No	48	6
Exercise contraindicated for women with poorly controlled GDM	Yes	435	54
	No	97	12
	I don't know	274	34
Exercise contraindicated for women with vertigo	Yes	226	28
	No	65	8.1

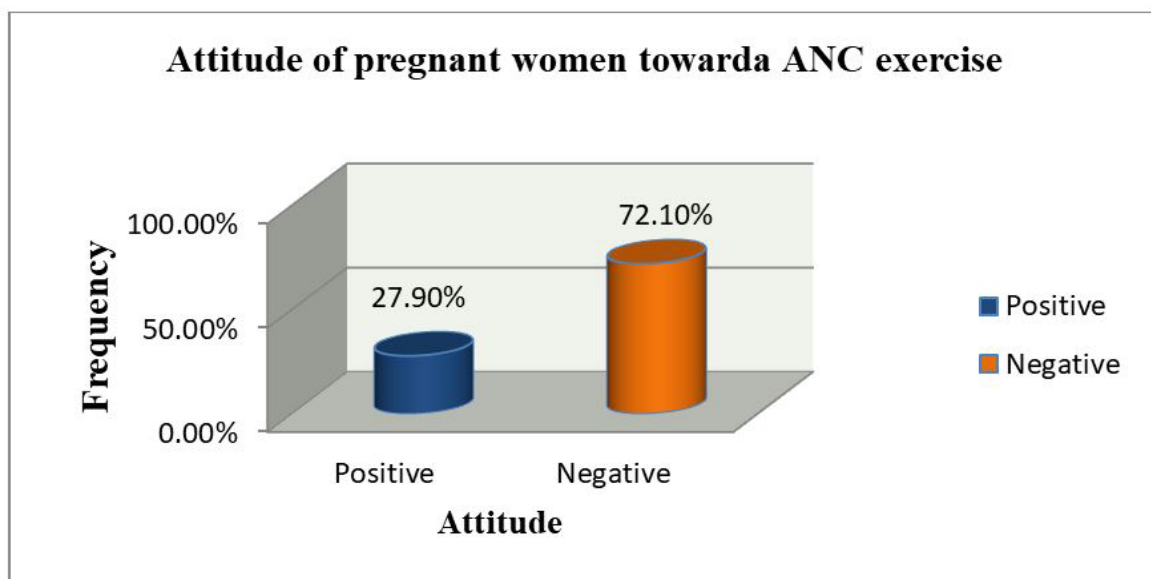


Figure 1: Attitude towards ANEx among pregnant women attending ANC clinic at selected health centers in Addis Ababa, Ethiopia, 2021(n=806).

In Addis Ababa alone, antenatal exercise was frequented in about one fourth of the participants 180(22.3%) in the current pregnancy as opposed to the rest. Most common reasons cited by the pregnant women for not engaging in physical exercise in current pregnancy were lack of health care provider counseling, had no idea and considered it risky to the fetus with values of 10.3%, 41.8% and 22.5%, respectively. Of those who participated in ANEx, 53.9% practiced walking, 15.0% aerobics fol-

lowed by relaxation/breathing and doing two or more exercises with values of 12.8% and 11.1%, respectively. Among those who practiced ANEx, 21.7% and 67.2% were practicing with a frequency of equal or more than three times per week and of 20 or more minutes of duration of exercise per session, respectively and only 9.1% were guided by someone else (Table 6, Figure 2, Figure 3).

Table 6: Percentage distribution of antenatal exercise practice among pregnant women who attending ANC at selected health centers (n= 806), Addis Ababa, Ethiopia, 2021.

Variables	Categories	Frequency	Percent (%)
What are the types of exercise you perform?	Walking	97	53.9
	Aerobics	27	15.0
	Breathing	23	12.8
	Pelvic	8	4.4
	Back	4	2.2
	Ankle and toe	1	0.6
	Two and above	20	11.1
Who advised you to do ANC exercise?	Health profession	32	17.8
	Self	75	41.7
	Someone else	73	40.5
How many times do you exercise per week?	≤ 2 times	141	78.3
	≥ 3 times	39	21.7
Minutes taken to exercise per session?	< 20	59	32.8
	≥ 20	121	67.2
Do you believe ANC exercise is important	Yes	629	78.0
	No	80	9.9
	No, I don't know	97	12.0
Does ANC exercise put the fetus in danger?	Yes	335	41.6
	No	194	24.1
	No, I don't know	277	34.4
ANC exercise suits with our culture?	Yes	501	62.2
	No	305	37.8
ANC exercise reduces pregnancy related complication?	Yes	612	75.9
	No	97	12.0
	No, I don't know	97	12.0
ANC exercise aid in post natal early recovery	Yes	604	74.9
	No	81	10.0
	No, I don't know	121	15.0
ANC exercise helps for the mothers' fitness and wellbeing	Yes	677	84.0
	No	48	6.0
	No, I don't know	81	10.0

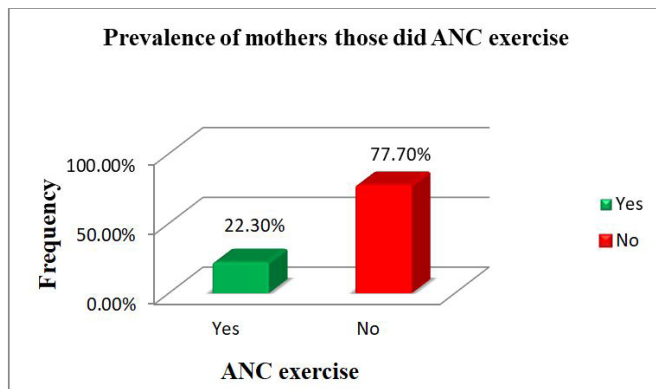


Figure 2: ANC exercise performing mothers among pregnant women attending ANC clinic at selected health centers in Addis Ababa, Ethiopia, 2021(n=806).

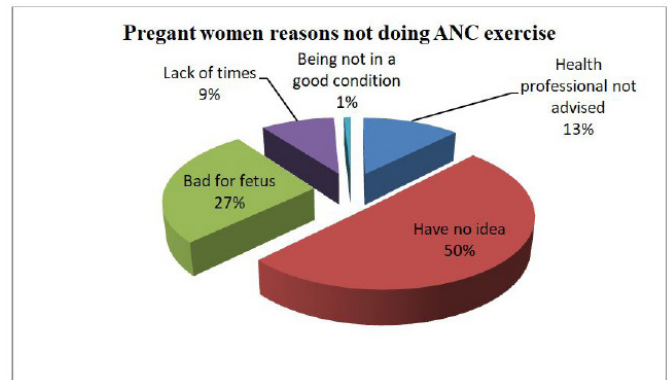


Figure 3: Reasons for not doing ANC exercise among pregnant women attending ANC clinic at selected health centers in Addis Ababa, Ethiopia, 2021 (n=806).

After adjusting the results of bivariate analysis in order to decrease or remove confounding variables, multivariable logistic regression was performed. In multivariate analyses when adjusted for the other independent variables, educational level of pregnant mother was a significant factor on respondents' knowledge of ANEx with those who completed high school and college or university were found to have been 2.001 and 3.081 times more likely to be knowledgeable about antenatal exercise than the illiterate with AOR= [2.001, 95% CI (1.106, 2.234)] and AOR= [3.081, 95% CI (1.038, 4.012)*], respectively. In addition, home-based activities of the pregnant mothers were found as a significant factor on knowledge of ANEx. Those who had nothing to do at home were 49% more likely to be knowledgeable

about antenatal exercise than those mothers who did cooking for their family [AOR=0.510; (0.016, 1.082)].

Participating in physical exercise before becoming pregnant had significant association with knowledge of ANEx. Respondents who had never practiced physical exercise before becoming pregnant were 56.6% times less likely to be knowledgeable than who have done physical exercise AOR=[0.414, 95% CI (0.023,1.014), (Table 7). Moreover, pregnant women who never heard about antenatal exercise were 20.7% times less likely to be knowledgeable about antenatal exercise AOR= [0.793, 95% CI (0.107, 2.031)] (Table7)

Table 7: Bivariate and multivariate analysis of determinant for knowledge of antenatal exercise among pregnant women at selected health centers in Addis Ababa, Ethiopia, 2021.

Variables	Categories	Knowledge on ANC exercise		COR 95% CI	P value	AOR 95% CI	P value
		Good (N %)	Poor (N %)				
Age	< 20	16(34)	31(66)	1		1	
	20 – 34	186(33.9)	362(66.1)	1.005(0.536,1.884)	0.989	0.076(0.054,1,045)	0.078
	≥ 35	204(96.7)	7(3.3)	0.018(0.007,0.046)	0.000*	0.874(0.123,0.719)	0.143
Marital status	Married	320(46.9)	362(53.1)	1		1	
	Unmarried	41(73.2)	15(26.8)	0.323(0.176,0.595)	0.000*	0.014(0.00,1.267)	1.014
	Others	45(66.2)	23(33.8)	0.452(0.267,0.763)	0.003*	1.032(0.203,3.012)	0.813
Education	Illiterate	53(53.5)	46(46.5)	1		1	
	Read and write	0	101(100)	1.861(0.001,0.023)	0.986	0.067(0.021,0.817)	0.069
	Primary	5(4.0)	119(96)	27.422(10.312,72.921)	0.000*	1.683(0.106,1.234)	0.810
	Secondary	116(48.5)	123(51.5)	1.222(0.764,1.954)	0.403	2.001(0.120,3.201)	0.043*
	Certificate and above	232(95.5)	11(4.5)	0.055(0.027,0.112)	0.000*	3.081(1.038,4.012)	0.024*
Occupation	G. employ	214(52.5)	194(47.5)	0.604(0.168,2.174)	0.441		
	House wife	54(27.4)	143(72.6)	1.765(0.480,6.499)	0.393		
	Own business	134(70.2)	57(29.8)	0.284(0.077,1.043)	0.058		
	Others	4(40)	6(60)	1			

Home to work transportation	Walking	145(63.3)	84(36.6)	1		1	
	Use automobile	261(45.2)	316(54.8)	2.090(1.526,2.863)	0.000*	1.505(0.103,1,109)	0.067
Working days per week	≤ 3 days	1(1.3)	79(98.8)	1		1	
	≥ 4 days	119(96)	5(4.0)	0.001(0.000,0.005)	0.000*	0.054(0.023,0.317)	0.053
Home activity	Nothing	15(11.8)	112(88.2)	1		1	
	Cooking	101(26)	288(74)	0.382(0.213,0.685)	0.001*	0.510(0.016,1.082)	0.031*
	Looking after kids	192(96.8)	7(3.52)	0.201(0.321,1.302)	0.993	0.06(0.041,1.015)	0.601
	Others	80(87.9)	11(12.1)	0.402(0.612,2.311)	0.996	0.558(0.326,1.059)	0.077
Parity	Have none (0)	16(5.4)	278(94.6)	1		1	
	1	31(26.7)	85(73.3)	1.158(0.082,1.302)	0.042	1.021(0.203,2.081)	0.063
	2 – 4	299(89)	37(11)	0.007(0.004,0.013)	0.000*	0.105(0.612,1.001)	0.051
	≥ 5	39(65)	21(35)	0.204(0.406,1.075)	0.402	1.010(0.901,2.034)	0.101
History of pre pregnancy exercise	Yes	100(34)	194(66)	1		1	
	No	306(59.8)	206(40.2)	0.347(0.257,0.468)	0.000*	0.414(0.023,1.014)	0.032*
Heard about ANC exercise	Yes	100(29.7)	237(70.3)	1		1	
	No	306(65.3)	163(34.7)	0.225(0.166,0.304)	0.000*	0.793(0.107,2.031)	0.041*
Source of information	Health professional	6(30)	14(70)	0.897(0.327,2.465)	0.834		
	Family/friends	44(31)	98(69)	0.857(0.529,1.388)	0.530		
	Mass media	50(27.7)	130(72.2)	1			

The multivariate analysis revealed that age of the mothers, educational status, history of pre pregnancy exercise and those mothers who had good knowledge had significant association with positive attitude towards antenatal exercise. Respondents whose ages were greater than or equal to 35 years were 2.324 times more likely to have a favorable attitude on ANC exercise than those aged less than 20 years of pregnant women with [AOR=2.324, 95% CI (1.305,4.017)]. Those mothers who have completed college and above were found 3.141 times more to have had positive attitude than those mothers who had no for-

mal education with AOR= [3.141, 95% CI (1.612,6.031)]. By controlling for other variables and as well for confounding variables, those mothers who had history of pre-pregnancy exercise were 3.041 times more likely to have favorable attitude than from those of their counter parts with AOR= [3.041, 95% CI (2.401, 5.102)]. Pregnant mothers who had good knowledge are 1.201 times more likely to have favorable attitude than those with poor knowledge about antenatal exercise with AOR= [1.201, 95%CI (2.304, 4.021)] (Table 8).

Table 8: Bivariate and multivariate analysis of determinant for Attitude of antenatal exercise among pregnant women at selected health centers in Addis Ababa, Ethiopia, 2021.

Variables	Categories	Attitude ANEX		COR 95% CI	P value	AOR 95% CI	P value
		Positive	Negative				
Age	< 20	31(66)	16(34)	1		1	
	20 – 34	372(67.9)	176(32.1)	0.917(0.488,1.720)	0.786	1.341(0.402,2.048)	0.077
	≥ 35	178(84.4)	33(15.6)	0.359(0.177,0.730)	0.005*	2.324(1.305,4.017)	0.050*
Marital status	Married	506(74.2)	176(25.8)	1		1	
	Unmarried	39(69.6)	17(30.4)	1.253(0.691,2.272)	0.457	0.105(0.241,1.030)	0.107
	Others	36(52.9)	32(47.1)	2.556(1.541,4.239)	0.000*	1.034(0.234,1.205)	1.061
Education	Illiterate	88(88.9)	11(11.1)	1		1	
	Read and write	45(44.6)	56(55.4)	0.00(0.00)	0.996	1.045(0.169,2.042)	0.107

	Primary	122(98.4)	2(1.6)	0.131(0.028,0.606)	0.009*	1.002(0.312,1.209)	0.071
	Secondary	134(56.1)	105(43.9)	6.269(3.186,12.335)	0.000*	2.023(1.041,3.416)	0.041*
	Certificate and above	136(56)	107(44)	6.294(3.201,12.375)	0.000*	3.141(1.612,6.031)	0.027*
Occupation	Gov. employ	233(57.1)	175(42.9)	1		1	
	House wife	185(93.9)	12(6.1)	0.086(0.047,0.160)	0.000*	0.234(0.105,1.002)	0.103
	Own business	153(80.1)	38(19.9)	0.331(0.220,0.496)	0.000*	0.041(0.204,1.001)	0.074
	Others	7(70)	3(30)	0.013(0.021,1.032)	0.649	1.012(1.034,2.301)	0.243
Home to work transportation	Walking	124(54.1)	105(45.9)	1		1	
	Use automobile	457(79.2)	120(20.8)	0.310(0.223,0.431)	0.000*	0.312(0.130,1.020)	0.062
Working days per week	≤ 3 days	79(98.8)	1(1.2)	0.002(0.00,0.017)	0.000*	0.021(0.102,0.607)	0.056
	≥ 4 days	19(15.3)	105(84.7)	1		1	
Family monthly income in ETB.	< 1000	58(86.6)	9(13.4)	1		1	
	1000 – 3000	98(71)	40(29)	2.630(1.191,5.811)	0.017*	1.041(0.023,1.701)	0.204
	3001 – 5000	289(85.5)	49(14.5)	1.093(0.509,2.347)	0.820	0.104(0.201,2.032)	0.601
	≥ 5001	136(51.7)	127(48.3)	6.018(2.864,12.647)	0.000*	2.021(1.071,2.061)	0.432
Gravidity	1	281(95.6)	13(4.4)	0.048(0.028,0.095)	0.000*	2.042(1.204,3.402)	0.934
	2 – 4	250(60.4)	164(39.6)	0.683(0.439,1.063)	0.092	1.03(0.245,2.401)	0.501
	≥ 5	50(51)	48(49)	1		1	
Parity	Have no (0)	281(95.6)	13(4.4)	1.117(0.053,0.258)	0.061		
	1	85(73.3)	31(26.7)	0.922(0.460,1.850)	0.820		
	2 – 4	172(51.2)	164(48.8)	2.412(1.322,4.398)	0.104		
	≥ 5	43(71.7)	17(28.3)	1			
No. of alive children	Have no (0)	281(92.4)	23(7.6)	0.348(0.071,0.312)	0.031		
	1	84(80)	21(20)	0.453(0.209,0.984)	0.045		
	2 – 4	187(53.1)	165(46.9)	1.599(0.839,3.049)	0.154		
	≥ 5	29(64.4)	16(35.6)	1			
History of abortion	Yes	69(78.4)	19(21.6)	0.55(0.402,1.166)	0.163		
	No	512(71.3)	206(28.7)	1			
Gestational age of current pregnancy	1st Tm pregnancy	329(91.4)	31(8.6)	0.248(0.151,0.406)	0.061	1.014(0.231,2.034)	0.106
	2nd Tm pregnancy	123(45.9)	145(54.1)	3.104(2.065,4.664)	0.000*	2.012(1.104,3.423)	0.704
	Third Tm pregnancy	129(72.5)	49(27.5)	1		1	
History of pre pregnancy exercise	Yes	194(66)	100(34)	1.406(1.165,2.186)	0.004*	3.041(2.401,5.102)	0.028*
	No	387(66.6)	125(24.4)	1		1	
Heard about ANC exercise	Yes	237(70.3)	100(29.7)	1.161(0.851,1.584)	0.346		
	No	344(73.3)	125(26.7)	1			
Source of information	Health professional	14(70)	6(30)	1.114(0.406,3.061)	0.834		
	Family/friends	98(69)	44(31)	1.167(0.720,1.891)	0.530		
	Mass media	130(72.2)	50(27.8)	1			
Knowledge	Good	181(44.6)	225(55.4)	0.627(0.502,1.103)	0.022*	1.201(2.304,4.021)	0.026*
	Poor	341(85.3)	59(15.5)	1		1	

In the multivariate analysis it was ascertained that the fact that they heard about ANC exercise were 3.102 times more likely to engage in ANC exercise than their counter parts AOR= [3.102, (2.036, 4.102)]. In addition, those who had good knowledge about ANEx were 2.204 times more likely to practice ANEx

than the mothers with poor knowledge AOR= [2.204, 95% CI (2.412, 5.001)]. The participants who were in the unfavorable attitude were 50.1% less likely to practice ANEx in comparison to those who had favorable attitude AOR= [0.501, 95% CI (1.020, 2.101)] (Table 9).

Table 9: Bivariate and multivariate analysis of determinant for Practice of antenatal exercise among pregnant women at selected health centers in Addis Ababa, Ethiopia, 2021

Variables	Categories	Practice of ANC exercise		COR 95% CI	P value	AOR 95% CI	P value
		Yes (n %)	No (n %)				
Age	< 20	18(38.3)	29(61.7)	1		1	
	20 – 34	143(26.1)	405(73.9)	1.758(.947,3.262)	0.074	0.00(0.000)	0.994
	≥ 35	19(9.0)	192(91.0)	6.272(2.952,13.238)	0.000*		
Marital status	Married	162(23.8)	520(76.2)	0.553(0.277,1.108)	0.095		
	Unmarried	8(14.3)	48(85.7)	1.034(0.379,2.827)	0.947		
	Others	10(14.7)	58(85.3)	1			
Education	Illiterate	8(8.1)	91(91.9)	0.748(0.307,1.826)	0.524	2.074(1.041,3.040)	0.675
	Read and write	44(43.6)	57(56.4)	0.085(0.044,0.164)	0.000*	6.063(2.014,7.1.3)	1.612
	Primary	57(46)	67(54)	0.077(0.041,0.145)	0.000*	1.383(1.67,11.455)	0.764
	Secondary	56(23.4)	183(76.6)	0.215(0.118,0.393)	0.000*	0.142(0.023,0.645)	0.325
	Certificate and above	15(6.2)	228(93.8)	1		1	
Occupation	Gov. employ	77(18.9)	331(81.1)	1.075(0.224,5.161)	0.928		
	House wife	93(47.7)	104(52.8)	0.280(0.058,1.350)	0.113		
	Own business	8(4.2)	183(95.8)	5.719(1.041,31.415)	0.045		
	Others	2(20)	8(80)	1			
Home to work transportation	Walking	31(13.5)	198(86.5)	2.224(1.458,3.391)	0.000*	0.021(0.213,0.461)	0.054
	Use automobile	149(25.8)	428(74.2)	1		1	
Working days per week	≤ 3 days	3(3.8)	77(96.3)	1		1	
	≥ 4 days	27(21.8)	97(78.2)	0.140(0.041,0.479)	0.032		
Home activity	Nothing	22(17.3)	105(82.7)	2.121(1.119,4.022)	0.021*	0.105(0.203,1.041)	0.054
	Cooking	115(29.6)	274(70.4)	1.059(0.645,1.738)	0.821	1.312(0.310,1.504)	0.430
	Looking kids	15(7.5)	184(92.5)	5.452(2.736,10.862)	0.000*	2.948(1.010,3.413)	0.066
	Others	28(30.8)	63(69.2)	1		1	
Gravidity	1	90(30.6)	204(69.4)	1		1	
	2 – 4	81(19.6)	333(80.4)	1.814(1.282,2.566)	0.001*	1.020(1.053,2.102)	0.901
	≥ 5	9(9.2)	89(90.8)	4.363(2.104,9.044)	0.000*	1.061(1.404,3.057)	0.106
Parity	Have no	90(30.6)	204(69.4)	0.178(0.019,0.327)	0.401		
	1	52(44.8)	64(55.2)	0.342(0.010,0.182)	0.034		
	2 – 4	36(10.7)	300(89.3)	0.287(0.010,0.182)	0.092		
	≥ 5	2(3.3)	58(96.7)	1			
No. of alive children	Have no	93(30.6)	211(69.4)	0.152(0.007,0.380)	0.054		
	1	49(46.7)	56(53.3)	0.326(0.003,0.596)	0.040		
	2 – 4	37(10.5)	315(89.5)	0.193(0.026,1.446)	0.109		
	≥ 5	1(2.2)	44(97.8)	1		1	
Heard about ANC exercise	Yes	117(34.7)	220(65.3)	0.292(0.206,0.413)	0.000*	3.102(2.036,4.102)	0.034*

	No	63(13.4)	406(86.6)	1		1	
Source of information	Health professional	8(40)	12(60)	1		1	
	Family/friends	22(15.5)	120(84.5)	3.636(1.333,9.919)	0.012*	0.67(0.021,1.012)	0.907
	Mass media	87(48.3)	93(51.7)	0.713(0.278,1.826)	0.480	0.162(0.010,2.755)	0.208
Knowledge	Good	45(11.1)	361(88.9)	4.087(2.815,5.933)	0.000*	2.204(2.412,5.001)	0.047*
	Poor	135(33.8)	265(66.3)	1		1	
Attitude	Positive	36(16)	189(84)	1		1	
	Negative	144(24.8)	437(75.2)	0.578(0.386,0.865)	0.008*	0.501(1.020,2.101)	0.050*

Note: - * significant variables/value at p-value ≤ 0.05 , ANEx: antenatal exercise, AOR: Adjusted odds ratio, COR: crude odds ratio

Discussion

This study was carried out to assess the level of knowledge, attitude, practice and other associated factors of antenatal exercise among pregnant women having antenatal follow-up at the selected health centers in Addis Ababa, Ethiopia. The study recruited 806 participants. The respondents' age ranged from 18-38 years with the mean age of 29.02 ± 4.1 years; and 84.6% of them were married. Among the respondents, 29.7% and 30.1% had completed high school and college or university, respectively. Regarding occupational status, half of the respondents 408 (50.6%) were government employee whereas 191 (23.7%) were self-employed.

Of the clients, 294 (36.5%) had history of pre-pregnancy physical exercise, and 337 (41.8%) heard about ANEx, which is comparable with hospital-based cross-sectional study done at Gondar and a South African study, but there is a discrepancy from the study done in Brazil, where 68.1% heard about ANEx. This can be explained on the basis of the difference in practice of health care professionals in advising women during their antenatal period about ANEx and their ANC guidelines. This study showed that 20(5.9%), 142(42.13%), and 180(53.41%) relate to the source of information being health professionals, family/friends and mass as well as social media, respectively in contrast to the 33.8% from health care providers in the Gondar study and Tigray; and in the Brazilian article, the main source of information were reportedly from television (55.3%), books and magazines (24.2%) and as well from the healthcare units (20%). This variation could be due to lack of a common national guideline pertaining to antenatal exercise denoting that the different institutions may be governed by their set approaches [22-24].

It was found out that 50.4% of the study population was knowledgeable about antenatal exercise and this result is similar with the published results from Nigeria (52.4%) and India (50.67%) but lower than the report from Brazil (65.6%). It was noted that 67.1%, 70.1% and 55% did correctly identify that antenatal exercise can decrease back pain, prevents excessive weight gain and increase energy and stamina during pregnancy, respectively [20, 25, 26].

Regarding the attitude of pregnant women to physical exercise during pregnancy, 27.1% of them had positive outlook which is in contrast to the study result from Colombo (35.5%) and 55.3% from Gondar. The reason for such a low magnitude of favorable attitude towards antenatal exercise might be due to the difference

in methodology of the research whereby only third trimesters were included and moreover it is attributed to a composite of safety concern for their fetus, lack of awareness and inadequate level of knowledge [20, 27].

The percentage (22.3%) of those who practiced ANEx during their current pregnancy is very close to the study conducted in India (22.0%), but is lower than that reported from Gondar (30.9%), Canada (29.0%) and Brazil (29.0%). This difference might be due to low level of attitude to ANEx during third trimester, lack of awareness and experience of physical exercise before pregnancy, lack of motivation and health care provider counseling which is comparable with the study results of other countries. The most common reasons cited by the pregnant women for not engaging in physical exercise in current pregnancy were lack of health care provider counseling, had no idea and aired fear of risk to the fetus with frequencies of 10.3%, 41.8% and 22.5%, respectively. This study demonstrated that walking (53.9%), aerobics (15%), and relaxation breathing exercise (12.8%) were the most commonly practiced ANEx. This finding is in agreement with a study that was reported from Brazil and also a study conducted in Nigeria that showed walking, aerobics, relaxation and breathing were among the most common practiced types of antenatal exercise [20, 22-29].

The finding of this study showed that good knowledge of antenatal exercise was significantly associated with expectant mothers who have higher educational level (completed secondary and those who joined college or university), and those who heard about ANEx previously. Furthermore, a positive attitude is significantly linked with higher education level than those who heard about ANEx in the past and pregnant women who have good knowledge about ANEx. It was ascertained that the practice of physical exercise is higher among pregnant women who heard about ANEx, have had good knowledge and those with positive attitude towards it. The diversity of the reasons why the pregnant women were not practicing ANEx during the current pregnancy relate to have had no information (50%) about such undertaking, thought that ANEx is bad for the fetus (27%) and that 13% blamed the health professional for not advising them. These listed reasons are consistent with the study outcomes from Brazil and Canada [25, 27, 28].

As major strength, this study tried to address very much and too often an untouched but important component of antenatal care given to pregnant women. In this study, we used validated ques-

tionnaire for assessing ANEx, and we doubled the sample size in order to decrease sampling error contributing to the representativeness of the study, so that the information obtained from the study would be valuable as a baseline data for the researches that will be done in the future.

The study included only pregnant mothers in their third trimester attending ANC at governmental health institution and excluded private health institutions if one is to consider it as a serious setback. Nevertheless, our findings suggest that pregnant women's knowledge concerning the practice of antenatal exercise is comparably low by global standards but in harmony with most of the studies done in sub-Saharan countries and their attitude seems reasonably favorable. Relatively few pregnant women practiced exercises and very few did engage with the adequately recommended protocols as per the American College of Obstetricians and Gynecologists (ACOG) guidelines.

ANEx practice was independently and consistently associated with knowledge and attitude of pregnant women and it was shown to have had the largest effect size. It is, thus, advisable to have a national guideline for antenatal care givers that would incorporate ANEx as its component. Hence, managers and policy makers prioritize their action plans on ANC exercise, enhance the proportion of knowledge, attitude and practice of antenatal exercise conceptually by preparing a clear guideline tool to measure the performance of their work addressing the pitfalls encountered on the low prevalence rate and its associated factors.

It is highly recommended that the Department should work on promoting behavioural change emphasizing high level communication on health education on ANEx and to optimize the practice with the supportive knowledge and positive attitude in line with studied recommendations [30-32]. Equally, the health professional and community health workers should be alerted on issues of ANC exercise and to teach mothers to have self-confidence in the practice of antenatal exercise. Potential clients and the community at large need to prioritize the importance of having had antenatal exercise and to get proper health education.

It is suggested that researchers need to conduct similar studies in this area with design of preference that may include follow-up studies, community based and qualitative types to explore the actual levels of knowledge, attitude and practice of ANEx and to further examine the variables associated with it.

Abbreviations:

ACOG : American College of Obstetricians and Gynecologists
ACSM : American College of Sports Medicine
ANC : Antenatal Care
ANEx : Antenatal Exercise
CDC : Center for Disease Control and Prevention
CSA : Central Statistical Agency/Ethiopia
GDM : Gestational Diabetes Mellitus
KAP : Knowledge, Attitude and Practice
MET : Metabolic Equivalent Time
NGO : Non Governmental Organization
PP : Probability Proportional
PPS : Projected Population Size
SPSS : Statistical Package for Social Science

SRS : Simple Random Sampling
SS : Sample Size
SSS : Multi-stage Stratified Sampling Technique
WHO : World Health Organization

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