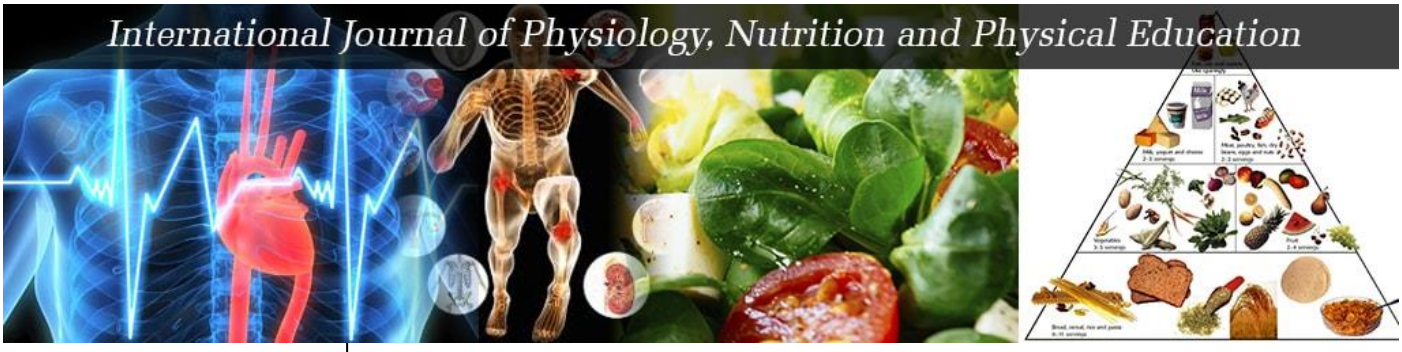

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The nexus between accessibility to physical activity resources and participation in leisure time physical activities in Addis Ababa, Ethiopia

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Abstract
The purpose of this study was to investigate the nexus between accessibility of public sport and recreational facilities and the level of participation of adult residents in physical activities in Nefas Silk Lafto sub-city in Addis Ababa. The study participants were adult residents (n=384) living in the sub-city, experts (n=32) and heads (n=3) of the Department for Sport Facility Development. We used questionnaires, interview, and observations to collect the data and descriptive method and chi-square tests were employed for analysis. The results show that adult residents had poor access to physical activity resources in their neighbourhoods and poor access had a significant association (χ^2=30.6, p<.05) with participation of the residents in LTPA. Interventions initiated by the local governments to promote exercise behavior of the residents in the study area should pay attention to provide access to supportive physical activity resources.

Keywords: Physical environment, recreational facilities, intervention, accessibility, suitability

Introduction
Regular participation in planned physical activities plays tremendous roles in meeting different social, psychological and health goals (Rhodes *et al.*, 2012; WHO, 2003) [13, 29]. It is the most cost-effective means in the maintenance of optimal health, prevention of non-communicable diseases and the promotion of public health in general (Xiong, 2010) [33]. Despite the benefits, many people in the world do not have exercise behavior (WHO, 2003) [29]. The prevalence of physical inactivity has been increasing among particularly the people in urban environment.

Along with other factors, the increased physical inactivity, nowadays, has predisposed the people to chronic non-communicable diseases which are becoming a leading killer health challenge (Bellew *et al.* 2011; WHO, 2005; Macera *et al.* 2003) [28, 29, 9]. Physical inactivity is the prominent cause of nearly 21.25% of breast and colon cancers and 27 % of diabetes and 30 % of ischemic heart diseases (WHO, 2010) [27]. It has been estimated to be 1.5 to 2 fold high risk of most chronic diseases like ischemic heart disease, hypertension, type II diabetes and mellitus (Rendeze *et al.* 2014) [15].

Poor physical activity behavior of individuals and the community as a whole is induced by many different factors including psychological, socio-cultural and physical environmental (Brochado *et al.* 2008) [1]. Even though other determinants have contribution to the physical inactivity, the influence of physical environment to either encourage or discourage people to participate in sport and recreations have been given recognition in theory and practice (Ries *et al.* 2011; Wicker *et al.* 2009) [14, 30]. Even an intervention initiated to change the behavior of the people for physical activity cannot be effective in the presence of barriers in the physical environment (McCormack *et al.*, 2004; Cerin *et al.* 2010; Sallis *et al.* 2008 & 2009) [10, 3 17, 18].

The physical environment involves the presence of suitable formal and informal sport and recreational facilities that could enhance mass participation. Several studies report that for the people to be encouraged to participate in leisure time physical activities, the physical environment in which they live in should be supportive (Sallis *et al.* 2008, 2009) [17, 18]. This implies that they should be provided with access to the public sport and recreational facilities (PSRF)

in their neighborhoods (Eime *et al.*, 2017; Hallmann *et al.*, 2012; Witten *et al.*, 2008; Roemmich *et al.*, 2006) [4, 6, 31, 16]. Accessibility of the facilities relates to availability of adequate and suitable physical activity resources that can be used for sport and recreation by equally all residents regardless of their social and physical backgrounds.

Access to suitable PSRF has a positive association with the level of participation of the community in LTPA (Sugiyama *et al.*, 2010; Giles-Corti *et al.*, 2002) [3, 5]. The studies reveal that in the environment where people can access the facilities that meet their needs, level of participation increases.

Considering the contribution of availability and access to resources in the promotion of mass participation in LTPA, the Sport Policy of Ethiopia that was declared in 1998 [11] recognizes the necessity of developing sport and recreational facilities in different social settings of urban environment (Ministry of Youth and Sport, 1998) [11]. However, after 21 years of its implementation, the residents of Addis Ababa still have been expressing their grievances against scarcity of poor physical activity resources in their neighbourhoods and its influence on their motivation to engage in sport and recreation. Most of the residential neighbbourhoods in Addis Ababa do not have playing fields and open spaces planned for recreation (Tufa, 2015) [25]. Several available open spaces and green areas in the residential areas of the city have been misused, grabbed for other non-recreational purpose and abandoned to become a dump. (Stebek, 2013; Tassew & Nair, 2014) [22, 24].

The purpose of this study was to examine the possible association between availability and accessibility of physical activity resources and participation of adult residents in LTPA in the residential neighbourhoods of Nefas Silk Lafto Sub-City in Addis Ababa. In the light of this purpose, we assessed availability and accessibility of the public sport and recreational facilities and the level of participation of the residents in sport and recreation.

2. Materials and methods

2.1 The setting

Addis Ababa is the capital city of Ethiopia located at the heart of the country. The administrative structure of the city is divided into 10 sub-cities one of which is Nefas-Silk Lafto in which we conducted this study. It is the 3rd largest sub-city in Addis Ababa with the area size of 63.59sq.km^2 and more than 400,000 residents living in it (NSLSC Administration, 2015) [12]. The lower administrative unit of a sub-city is woreda (district) and each sub-city has a definite number of woredas. Thus, Nefas Silk Lafto Sub-City consists of 12 woredas out of which the four were selected for this study (Figure 1).

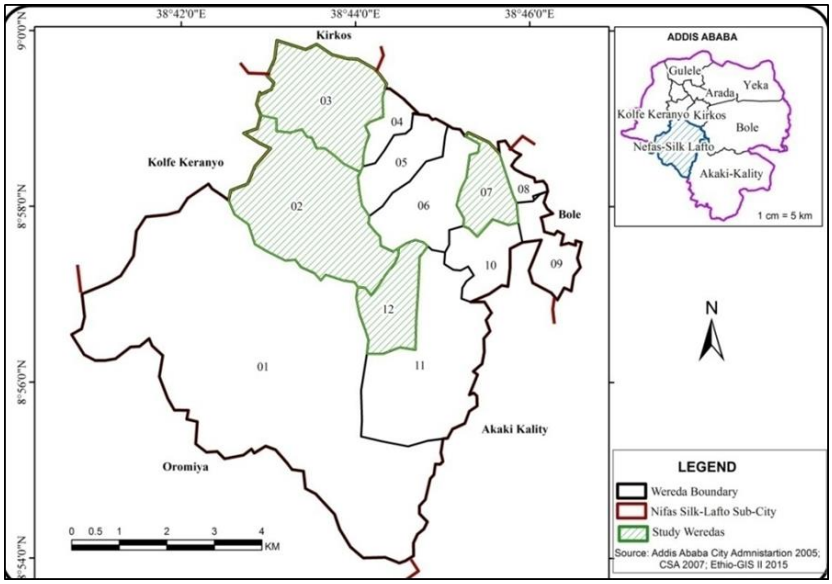

Fig 1: Administrative map of NSLSC (CSA, 2007)

2.2 Design

The design of the study was a cross-sectional survey and conducted using a mixed-method approach.

2.3 Participants

The primary population of the study was adult residents aged 18 – 64 years old living in the sub-city and the public sport and recreational facilities available in the residential neighbourhoods of the setting. Since youth and sport sector is the most responsible for the development of sport and recreational facilities and the promotion of mass participation, thirty- two experts and two heads from the sector were also taken to be informants.

2.4 Sampling

Out of the total residents in the age range of 18 – 64 living in the sub-city, 384 were selected applying four-stage random sampling. We determined the number of the participants using the table of determining the sample size in survey study developed by Krejcie and Morgan (1970) [7].

To select the samples (n=384) from the wider population, four-stage random sampling was used. At the first stage, 30% of the total (n=12) number of woredas namely 02, 03, 07 and 12, at the 2nd and 3rd stages, 40-50% of the ketenas and sefers were randomly selected. Ketena (zone) and Sefer (village) are the two tiers in each woreda in which the households are clustered. At the 4th stage, 384 households from the selected sefers were randomly identified by a lottery method and one adult resident from each household, based on the nearest birthday, was taken.

Moreover, we applied the census to involve 32 experts and 2 heads as informants in the study. This means all of the experts from each youth and sport office at the woreda, sub-city, and the city administration levels, and one head from each office of the city administration and sub-city were taken.

2.5 Instruments

We used questionnaires, interview, observation and GIS measures to collect the data. The questionnaires were used to collect the data from adult residents and the experts, and the interviews with the heads were guided by the interview protocol developed for this study. In developing the resident's questionnaire, International Physical Activity Questionnaire (IPAQ) was consulted and some items from the standardized tool were taken to our tool and contextualized to fit the purpose of the study. To ensure the quality of the tools before using them in the study, a couple of techniques were applied. That is, first, all of the instruments were commented by six university professors and the comments were used to revise them. Second, the revised questionnaires went through the pilot test and the feedback was used for final revision.

The observational survey tool was also constructed consulting the Physical Activity Resource Assessment (PARA) tool (Lee, 2005) [8]. Similarly, some pertinent items were adapted to our protocol. To evaluate the reliability of the observational tool, interrater reliability was assessed. When the percent agreement between the two raters was computed, the reliability was found to be 76%. This value is at the lower margin for the agreement to be absolute. Therefore, the survey tool used for observation in this study had anticipated reliability.

In addition, for assessing geo-location of the facilities GIS measure was conducted using GPS Garmin 60CSX.

2.6 Data collection procedure

All the data were collected from February to August 2018. During this time, we used eight assistant data collectors (two in each woreda) to distribute and collect back the residents' questionnaire from all the woredas. These assistant data collectors were recruited based on the set criteria and given one-and-a-half-day training. The distribution and collection of the experts' questionnaires, the interviews, observations and GIS measures all were managed by the experts. In the interview with the heads, two researchers participated at a time as interviewer and note takers, and the average length of time taken for an interview was 1:30 hours.

2.7 Measures

2.7.1 Socio-demographic characteristics

Demographic characteristics of the participants including gender, age, monthly income, level of education and religion were measured using self-administered questionnaires. Two of them, age and monthly income, were measured on the three and seven-point scales respectively that indicated the three age categories (18-34, 35-50, 51-64 years old) and seven levels of monthly income taken from the document showing the monthly income level of Ethiopian civil servants.

2.7.2 Self-reported physical activity participation

The level of participation in LTPA was measured by an item that asked the participants how many days they did planned physical activities in the last seven days. The possible responses for the item were presented on the five-point scale that ranged from "never" to "more than three days" of participation. In addition to this, two other items regarding what type of physical activities the participants engaged in and the experiences of family members to participate in physical activities were presented.

2.7.3 Perceived accessibility of PSRF

Accessibility is determined by not only the proximity between the facility and the household or the residential neighbourhoods but also other factors including their availability and quality of PSRF. It was measured by eight items that were presented in the questionnaire to obtain the perceptions of the residents. Of these items, the four were planned to measure accessibility and the other four were availability and suitability. The sample residents were asked, through these items. To rate their agreement or disagreement about proximity, availability, and suitability of the PSRF in their residential neighbourhoods.

2.7.4 Objective accessibility of PSRF

Observation and GIS were used to objectively measure accessibility of the facilities in the residential neighbourhoods. The observational protocol contained three groups of items. The first group required the observer to take notes on general information about the available facilities, the second was about the conditions of the facilities and the third about rating the proximity with reference to the residential neighbourhoods from which the sample households were selected. Besides, the geo-location of each of the facilities were measured using GPS Garmin 60 CSX

2.8 Data analysis

Descriptive statistics and chi-square tests were computed in the analysis of the data using SPSS version 22.0. Chi-square test was employed to examine the association between accessibility of the facilities and the level of participation of adult residents in NSLSC. The accepted significance level in testing the association was alpha 0.05. Descriptive method was calculated to obtain proportions in analyzing demographic variables and the data from the experts. In parallel with quantitative analysis, qualitative data collected using the interviews, observations and open-ended items of the questionnaires were described and explained.

3. Results and discussion

3.1 Results

3.1.1 Accessibility to PSRF

Out of the total (N=384) number of adult residents, 73% replied that there was no facility or inadequate facility available in their neighborhood. For the question asking about proximity of the available facilities, most (63.6%) of adult residents revealed as totally inaccessible and 34.5% fairly accessible. The data from the experts of sport facility development show similar results. Seventy-two percent of them agreed as there was scarcity of the facilities.

Regarding the types of available facilities, 46.7% pointed-out playing fields, 22.9% sport centers, and 16.7% ballgame courts. For the item asking about accessibility of these facilities, almost all (90.6%) agreed that the facilities were less accessible to the residents. The heads were also questioned, during the interviews, about availability, accessibility, and types of the facilities.

The observational data have verified that there were 21 PSRF in the study area as listed in the official document. We observed that there were three universal courts, 3 fitness centers, 3 tennis courts, 3 football fields, 3 communal open spaces, 3 green areas. 2 volleyball, one basketball courts, and one open field. But, most of these resources were not functional due to various reasons. Two green areas have been expropriated for another construction purpose. The other two were left with unfinished construction and five open spaces and playing fields were not in the condition to provide any recreational function.

The three tennis courts are the only standard facilities found in woreda 02 located in one compound. In addition, when the conditions of the available facilities were measured with the four-point rating scale, only the tennis courts and the three gymnasiums were found to be in very good status with the mean values of 4.00 and 3.29 respectively. All of the remaining facilities were evaluated to be very poor (M=1.55) in their neatness, attractiveness, flatness and being free from obstructions.

The GIS measure driven map, illustrating buffer zones around the facilities, portrays that most residential areas, in the aforementioned woreda, are included within 1km radii around the facilities. The one km buffer zones, depicted with green color, have covered most areas of the woreda. This explains that the facilities were located in the walking distances from almost all residential areas in the woreda. But, the problem was not proximity rather most of the facilities were not functional as explained earlier.

3.1.2 Level of participation in LTPA

Analysis of the self-reported data show that relatively large (49%) proportion of adult residents either never did physical activity (36.7%) or they did only one day (12.7%) in a week and 35.7% of them engaged for three and more days. Out of all male (n=221) and female (n=163) adult residents, 43% and 25 % respectively participated in LTPA for more than 3 and more days. Of those residents who did not totally do or did for one day, 55% was females. It shows that male adult residents (M=2.13) had more days of participation than females (M=1.26). The proportion of the residents who did not do was larger in all age categories (Table 1) the majority of residents perceived as there was no any (85.6%) or inadequate (71.4%) facilities in their neighbourhoods.

Table 1: Participation level of adult residents in LTPA by demographic characteristics

	Participation level - # (%)					M(SD)
Variables	**0 day**	**1 day**	**2 days**	**3days**	**>4days**	
Gender						
Male	50(22.6)	34(15.4)	42(19.0)	28(12.7)	67(30.3)	2.13(1.547)
Female	89(54.6)	15(9.2)	17(10.4)	11(6.7)	31(19.0)	1.26(1.608)
Age						
18 - 34	73(39.5)	17(8.2)	27(14.6)	23(12.4)	45(24.3)	1.73(1.646)
35 - 50	43(33.9)	17(13.4)	19(15.0)	11(8.7)	37(29.1)	1.86(1.656)
>50	23(31.9)	15(20.8)	13(18.1)	5(6.9)	16(22.6)	1.67(1.87)
Monthly income						
No income	44(54.3)	6(7.4)	10(12.3)	5(6.2)	16(19.8)	1.34(1.624)
>961	12(54.3)	1(4.5)	1(4.5)	2(9.1)	6(27.3)	1.5(1.819)
961 – 3000birr	35(37.2)	18(19.1)	15(16.0)	8(8.5)	18(19.1)	1.53(1.519)
3001 – 5000birr	36(31.0)	14(12.1)	17(14.7)	17(14.7)	32(27.6)	1.96(1.623)
5001 – 7000birr	10(23.8)	10(23.8)	6(14.3)	3(7.1)	13(31.0)	1.98(1.66)
7001 – 10000birr	1(5.3)	0(0.0)	7(36.8)	3(15.8)	8(42.1)	2.89(1.150)
10000– 15000birr	1(12.5)	0(0.0)	0(0.0)	1(12.5)	5(62.5)	3.13(1.458)
>15000birr	0(0.0)	0(0.0)	9(100.0)	0(0.0)	0(0.0)	0(0.0)

Note: Monthly Income=Ethiopian currency

Table 2 also illustrates that large (43%) number of participants who believed that the PSRF were inaccessible in their residential neighbourhoods did not participate in LTPA. But, out of those who replied fairly accessible, 43% did 3 and more days in a week.

Table 2: Accessibility and level of participation crosstabulation

Accessibility	**Participation level - # (%)**					**Total**
	0 day	**1 day**	**2 days**	**3days**	**>4days**	
Inaccessible	106(43.3)	32(13)	32(13)	28(11.4)	47(19.2)	245(100%)
Fairly accessible	33(24.8)	17(12)	26(19.5)	10(7.5)	47(35.3)	133(100%)
Accessible	0(0.0)	0(0.0)	1(33.3)	0(0.0)	2(66.7)	3(100%)
Inaccessible	0(0.0)	0(0.0)	0(0.0)	1(33.3)	2(66.7)	3(100%)

The opinions of the heads on the availability and accessibility of the facilities were also the same as that of the residents' and observational results. Accordingly, one of the heads said:

"……*even though the mayor promised to provide an opportunity to the residents for sport and recreation, the pledge has not been materialized and new PSRF facilities have not been developed as intended."*

The second head also pointed out as

"*we could see that the government and regional states have developed some facilities in the main towns including Addis Ababa. However, most of these facilities are for elite sports. If there are some, we observe that are not accessible because of their locations"*

3.1.3 Association between accessibility and level of participation in LTPA

The chi-square value 30.603 with df=12 and p<.05 in the test result (χ^2(12, N=384) =30.6, *p*=.002) indicates that there is an association between accessibility of PSRF and level of participation in LTPA. The Phi value. 282 of the test shows that the association was significant.

3.2 Discussion

This study aimed to investigate accessibility of PSRF in NSLSC, participation level of the residents in LTPA and the nexus between these two variables. The findings have reveal that physical activity resources were not accessible to the

residents in the residential neighbourhoods of NSLSC. Several factors including scarce availability, poor conditions, inappropriateness and using the spaces for other non-recreational purpose have contributed to the poor accessibility of the resources.

On top of this, the facilities that could promote mass participation such as public swimming pool, sport hall (Hallmann *et al.*, 2012; Wicker *et al.*, 2009) [6, 30], and parks (Woolley, 2011) were not totally available in the study area. This has also made the residents not to have access to PSRF in the residential neighourhoods.

These findings are consistent with the results of previous studies conducted in the same setting. Example: scarcity and inaccessibility of playing fields to the youth in Addis Ababa were reported in the study conducted by Tufa (2015) [25]. The author reported that due to the appropriation of public open spaces for non-recreation purposes, the residents of Addis Ababa, nowadays, have been denied the opportunity for participation in sports and expropriation. In the same way, the problems of open spaces and green areas in the city were underlined in the research findings of Tadesse (2008). Tassew and Nair (2014) [24], and Urban Planning, Sanitation and Beautification.

For the public sport and recreational facilities to provide equal opportunity to the community in urban environment, they should be available in the proximal distance and the residents should access them. If they are not accessible, the physical environment becomes a barrier that influences participation. Because accessibility of the PSRF in the residential neighbourhoods is one of the environmental determinants that either encourage or discourage participation in LTPA (Sreeramareddy *et al.*, 2012; Hallmann *et al.*, 2012; Ries *et al.*, 2011, Wicker *et al.*, 2009) [14, 30, 6].

The study found out that most adult residents in the sub-city did not have physical activity behavior. Female residents and residents with no income and low monthly income had less participation than male and relatively better income. This was evidenced by the reports of the residents and the perceptions of the experts who are responsible for enhancing community participation in LTPA. Although several factors, commonly contribute to poor participation, an opportunity for resources plays an important role in motivating the community (Sallis 2006, 2009 & 2012) [12, 13, 14]. Likewise, the results of this study pointed out that poor participation of the residents had a positive association with poor accessibility of the PSRF in the residential areas. Inaccessibility of the physical activity resources caused by poor availability and poor quality affects disadvantaged members of the community including women.

In agreement with, several studies conducted in different settings report that participation in physical activities is influenced by the environmental determinants (Sugiyama *et al.*, 2010; Giles-Corti *et al.*, 2002) [5, 3] including accessibility of the resources (Witten *et al.*, 2008; Roemmich *et al.*, 2009) [31, 16]

4. Conclusions

Physical environment plays an important role in motivating the population to participate in LTPA. One of the determinants in the physical environment that influences participation is accessibility to sport and recreational facilities. Accessibility to suitable sport and recreational facilities in urban environment makes a difference in one's decision to regularly do physical activities or not. As a result, participation in physical activities and accessibility to facilities are closely related. Interventions that ignore providing the residents with an opportunity to participate in sport and recreation cannot be effective to promote physical activity behavior of the population.

This study was not conducted without limitations. First, the sample size could not be the representative of the wider population. Future research investigating the same variables can involve more samples to increase reliability of the study. Second, the GIS was not used in this research to assess the distance between each household and the facility

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