

MATHS SESSION 3: IN-COUNTRY GAPS 1

Age range: 11–16 years

<p>Outline Learners will think about the types of activities they do each day and how long they spend doing them. They will consider the importance of using a large sample size when collecting data and then use frequency distribution tables to calculate the mean, mode and median for young people's time use in Ethiopia. They will use this data to compare how time use is affected by gender and place of residence (urban or rural).</p>		
<p>Learning objectives</p> <ul style="list-style-type: none"> To recognise the benefits of collecting data from a large sample size. To use frequency distribution tables to calculate the mean, mode and median of a set of time use data. To interpret and compare a set of time use data. 	<p>Learning outcomes</p> <ul style="list-style-type: none"> Learners will explain why the Young Lives researchers used a large sample size when collecting time use data. Learners will use frequency distribution tables to calculate the mean, mode and median for the amount of time young people in Ethiopia spend doing different activities. Learners will compare average time use for young people in Ethiopia, in terms of both gender and place of residence (urban or rural). 	
<p>Key questions</p> <ul style="list-style-type: none"> Why do we need a large sample size? How can we calculate average time use? In Ethiopia, what similarities and differences in time use are there between boys and girls or young people living in urban and rural areas? What do you think are the reasons for some of these similarities and differences? Do you think the differences are fair? 	<p>Resources</p> <ul style="list-style-type: none"> <i>Maths slideshow A</i> (slides 30–34) Resource sheets: <ul style="list-style-type: none"> <i>Hadush's day</i> <i>Welcome to my life – Hadush</i> <i>Comparing sample size</i> <i>Time use in Ethiopia – boys/girls/urban/rural</i> (Completed frequency distribution tables) Activity sheets: <ul style="list-style-type: none"> <i>Time use in Ethiopia – boys</i> <i>Time use in Ethiopia – girls</i> <i>Time use in Ethiopia – urban</i> <i>Time use in Ethiopia – rural</i> 	
<p>Curriculum links</p>		
<p>England KS3 Mathematics <i>Pupils should be taught to:</i> Statistics</p> <ul style="list-style-type: none"> Describe, interpret and compare observed distributions of a single variable through: appropriate graphical representation involving discrete, continuous and grouped data; and appropriate measures of central tendency (mean, mode, median) and spread (range, consideration of outliers). Construct and interpret appropriate tables, charts, and diagrams, including frequency tables and bar charts, for ungrouped and grouped numerical data. 	<p>Wales KS3 Mathematics Developing numerical reasoning</p> <ul style="list-style-type: none"> Interpret answers within the context of the problem and consider whether answers, including calculator, analogue and digital displays, are sensible. Draw conclusions from data and recognise that some conclusions may be misleading or uncertain. <p>Using data skills</p> <ul style="list-style-type: none"> Interpret diagrams and graphs. Use mean, median, mode and range. Examine results critically, select and justify choice of statistics, recognising the limitations of any assumptions and their effect on the conclusions drawn. 	<p>Scotland Mathematics and Numeracy</p> <ul style="list-style-type: none"> In order to compare numerical information in real-life contexts, I can find the mean, median, mode and range of sets of numbers, decide which type of average is most appropriate to use and discuss how using an alternative type of average could be misleading. MTH 4-20b I can research, compare and contrast aspects of time and time management as they impact on me. MNU 4-10a



Note:

- *These are suggested activities and resources to support your teaching rather than guide it. Additional teaching input may be required to develop learners' knowledge, skills and understanding of some of these concepts.*
- *The profiles of the featured young people in this resource are based on in-depth interviews with them in 2007 when they were aged 12 to 16 years old. This was done so that the young people would be of a comparable age to learners in the UK. Although there have been some significant changes in the communities and lives of these featured young people since 2007, there will still be some young people in these communities today with similar lives and stories.*

Activity 3.1 (15 min)

How do you spend your day?

- Ask learners what activities they do during a typical school day – both at school and at home. Write down their ideas on sticky notes.
- Discuss which of these activities could be grouped together. Ask learners what names they could give to these groups of activities, such as playing, helping at home or learning at school. Next ask the class which activities they think they spend the most time doing each school day. *Do you think that everyone will spend the same amount of time doing these activities?* You could discuss particular activities such as sleeping or doing household chores. Point out that even in a class of 30 there will be differences in time use.
- Explain that the Young Lives researchers have been looking at how much time young people in the four Young Lives countries spend doing different activities each day. Show slide 31 of *Maths slideshow A* which lists the different categories of daily activities that have been investigated.
- Show slide 32 or distribute copies of *Hadush's day*. Explain that this bar chart shows the daily time use data for Hadush in Ethiopia. Time use is rounded to the nearest hour. Discuss the data. You could ask the following questions:
 - *Does this data tell you much about how other young people in Ethiopia spend their time each day?*
 - *Do you think every young person in Ethiopia will have the same time use data as Hadush? Why or why not?*
 - *Which daily activities do you think might show similar time use across a range of young people in Ethiopia? Why do you think this?*
 - *Which daily activities might have time use data which varies a lot across a range of young people in Ethiopia? Why do you think this?*
- Distribute copies of *Welcome to my life – Hadush* for learners to read. A shortened version of this profile is provided on slide 33. Note that learners are introduced to Hadush in the *Introduction session* and *English sessions 1* and *2*. Highlight the fact that Hadush does not go to school and works full-time as a farm help each day. Point out that although not alone as a working child, Hadush is unusual because many young people of his age in Ethiopia do go to school rather than work.
- Explain that over the course of the project, the Young Lives researchers interviewed 3,000

young people in each of the Young Lives countries and used this data to calculate average time use for different activities. They used this to compare the effects of gender and place of residence (in either an urban or a rural area) on the amounts of time young people spend doing different activities.

- Ask learners why they think the researchers interviewed so many young people. Emphasise and discuss the importance of using a large sample size and calculating averages when collecting data. Remind learners that even in their class of 30 in the UK there are differences in the numbers of hours that learners spend doing different activities and the same will be true of young people in each of the four Young Lives countries. Draw out the point that learners cannot assume that all young people in Ethiopia will have similar lives and time use to Hadush. However, comparing his time use data to data from a larger sample size will enable learners to determine whether or not Hadush is typical or atypical in how he spends his time.

Activity 3.2 (15 min)

Comparing sample size

- Remind learners that Hadush is from a rural community in Ethiopia. Tell learners that they are now going to look at Young Lives time use data for samples of young people from rural communities in Ethiopia.
- Distribute copies of *Comparing sample size* or show slide 34. Explain that this bar chart shows the time use data for Hadush and two different samples of young people from rural Young Lives communities in Ethiopia. The blue bars show the time use data for Hadush, the red bars show the average time use data for a sample of 100 young people and the green bars show the average time use data for a sample of 1,000 young people.
- Ask learners to focus on the average data for the two samples first. You might like to ask the following questions:
 - *Which of the two samples' time use data do you think is most representative of young people living in rural communities in Ethiopia? Why do you think this?*
 - *Which daily activities show the most similarity between the three sets of time use data? Why do you think this is the case? Activities include: sleeping and play/leisure.*
 - *Which daily activities show the greatest variation between the three sets of time use data? Why do you think this is the case? Activities include: domestic tasks, tasks on family farm or business and at school.*
- Draw out the point that the larger the sample size, the more information there is. This reduces uncertainty within the data, meaning the result is a better representation of the entire group. The Young Lives researchers have therefore collected time use data from 3,000 young people in each of the countries to gain a more accurate assessment of how young people spend their time.
- Point out that there are approximately 40 million young people in Ethiopia aged between 0 and 14.* The Young Lives researchers collected data from just 3,000 young people, so clearly their data is still very limited. In addition, the Young Lives researchers collected data from a 'pro-poor' sample of communities because the study was set up to find out about the effects of poverty on young people's lives. This means that most of the families in their study were poor or relatively

poor. Although there will be similarities in time use among many communities in Ethiopia there will also be differences. Point out that some young people in Ethiopia, mostly living in bigger towns and cities, will use their time in similar ways to young people in the UK. Discuss why it would not be practical or possible to collect time use data for every young person living in Ethiopia, particularly in rural areas.

- Finish by asking learners to compare Hadush's time use data with the time use data from the sample of 1,000 young people. Discuss whether, according to this data, Hadush's overall daily time use is typical or atypical (it is atypical) and point out the danger of assuming that what is true for one individual is true for a wider group or community.

* World Bank Open Data: <http://data.worldbank.org/>

Activity 3.3 (45 min)

Calculating the average

- Explain that learners are going to be using Young Lives data to calculate average time use for samples of young people in Ethiopia. Each sample consists of 200 young people. Discuss possible measures (mean, median and mode) and how these can be calculated.
- Organise learners into small groups of two or three. Give each group a copy of one of the *Time use in Ethiopia* frequency distribution tables. Explain that learners will have a table containing the time use data from Ethiopia for one of four data sets: boys, girls, young people living in urban areas or young people living in rural areas.
- Support learners to calculate the mean, median and mode (measures of central tendency) for time use for each of the activities. Completed versions of each frequency table are provided in *Time use in Ethiopia* completed frequency distribution tables (the mean is given to two decimal places).
- Allow time for learners from different groups to share and discuss their results for the different groupings of young people. You could ask the following questions:
 - *What similarities and differences in time use are there in Ethiopia between boys and girls or between young people living in urban and rural areas?*
 - *What do you think might be the reasons for some of these similarities and differences?*
 - *Do you think the differences are fair?*
 - *Do you think time use would be similar for young people in the other Young Lives countries (India, Peru and Viet Nam)? Why or why not?*
 - *Do you think time use would be similar for young people in the UK? Why or why not?*
 - *How similar do you think average time use for these samples would be to average time use for all boys/girls/young people living in urban areas/young people living in rural areas in Ethiopia?*
 - *How similar do you think average time use from these samples would be to average time use for a Young Lives sample of 1,000 boys/girls/young people living in urban areas/young people living in rural areas in Ethiopia?*

- Explain that learners will be comparing time use data for all four Young Lives countries in *Maths session 4*. They will also be investigating in more detail the effects of gender and living in an urban or rural area on time use.

Further ideas

- Ask learners to collect time use data for young people in their class or school and use this to calculate the mean, mode and median time use for different activities. Learners could also compare average time use for boys and girls. They might like to compare results of different sample sizes. *Note that sensitivity is needed with this activity as some learners (for example, those who care for other family members or have other responsibilities at home) may not wish to discuss their time use and family situation with others.*

See Oxfam's *Everyone Counts, Unit 3 Session 3* for a more detailed outline of this activity.
www.oxfam.org.uk/education/resources/everyone-counts

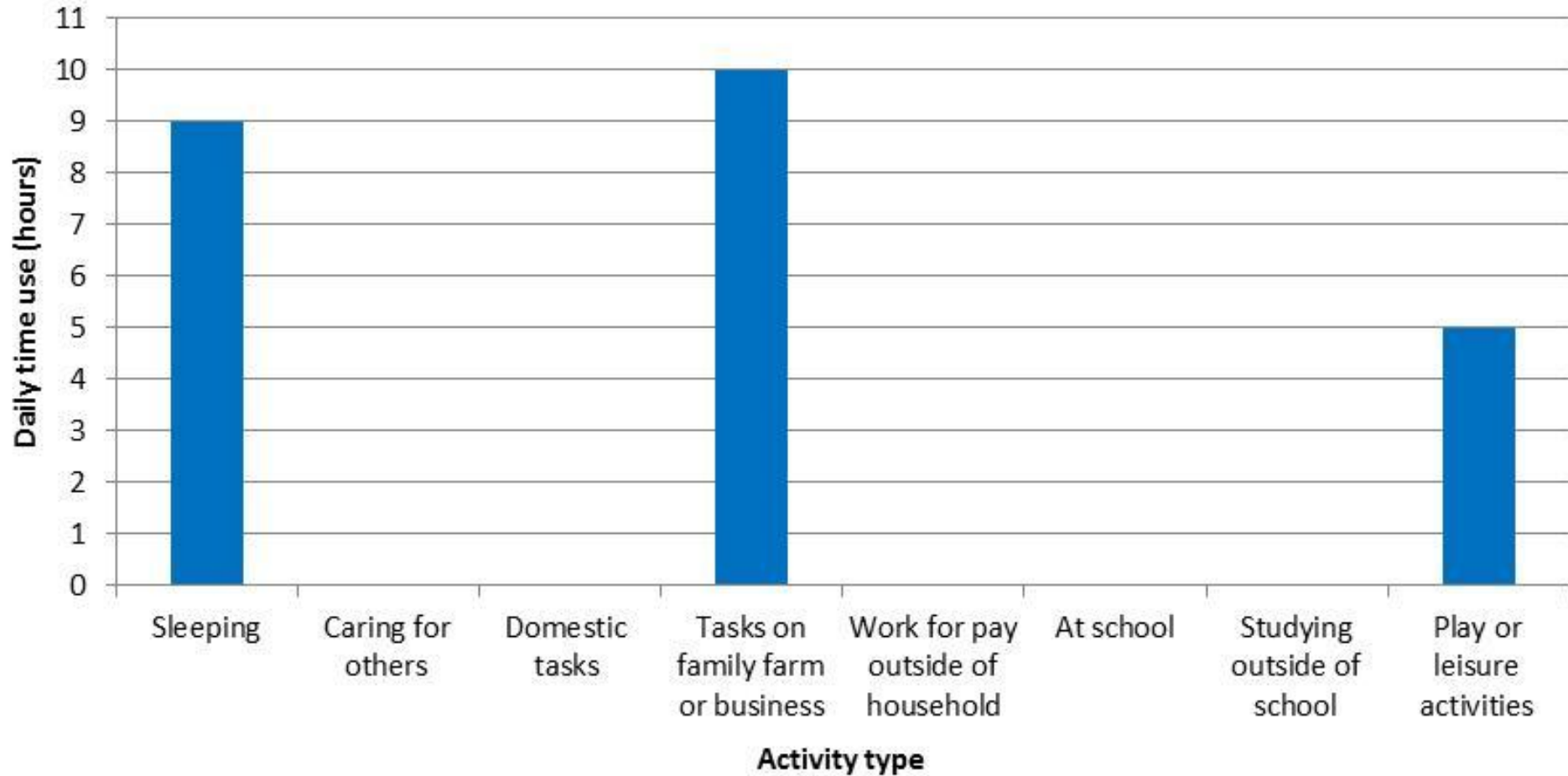
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Hadush's day

Bar chart



Welcome to my life

Hadush – rural Ethiopia

My name is Hadush (*Haa-doo-sh*) and I am 13 years old. I live with my father, stepmother and older siblings. We live in a village in a rural area in a northern part of Ethiopia called Tigray. My mother died when I was small and my father married again six years ago.

I don't go to school but my sisters do. I look after the cattle instead. From time to time I go to a traditional school at the house of a teacher who is a priest. I like this school. I plan to start regular school next year.

Our home is in a compound. Inside there are three buildings – the *hidmo*, *seqela* and the *adarash*. The *hidmo* (which means 'home') is a small room made of stone. The floor is made of earth, and its walls are rough. The *seqela* is a cattle pen. The *adarash* is a sleeping room with a traditional mattress on a bed made of mud. We have a lamp and a radio but no tables or chairs. We don't have electricity but there are plans to install an electricity supply in our community in the future.

I work to support my family. I like my work and I am proud to do it. I work around ten hours a day, from 8.00am until 6.00pm. I also help my stepmother to collect firewood and fetch water.

I am happy at the moment because my older brother has returned home from the army. He arrived back from the battlefield alive and wasn't affected by the war. I was very happy about that! My brother brought me all the things I asked him to, like a pair of shoes, a suit and some sandals. People who live well have all these things – shoes, trousers, jackets and meat like lamb and chicken.

Our most important holidays are Easter, New Year and Epiphany. We celebrate by eating chicken or lamb and buying new clothes.

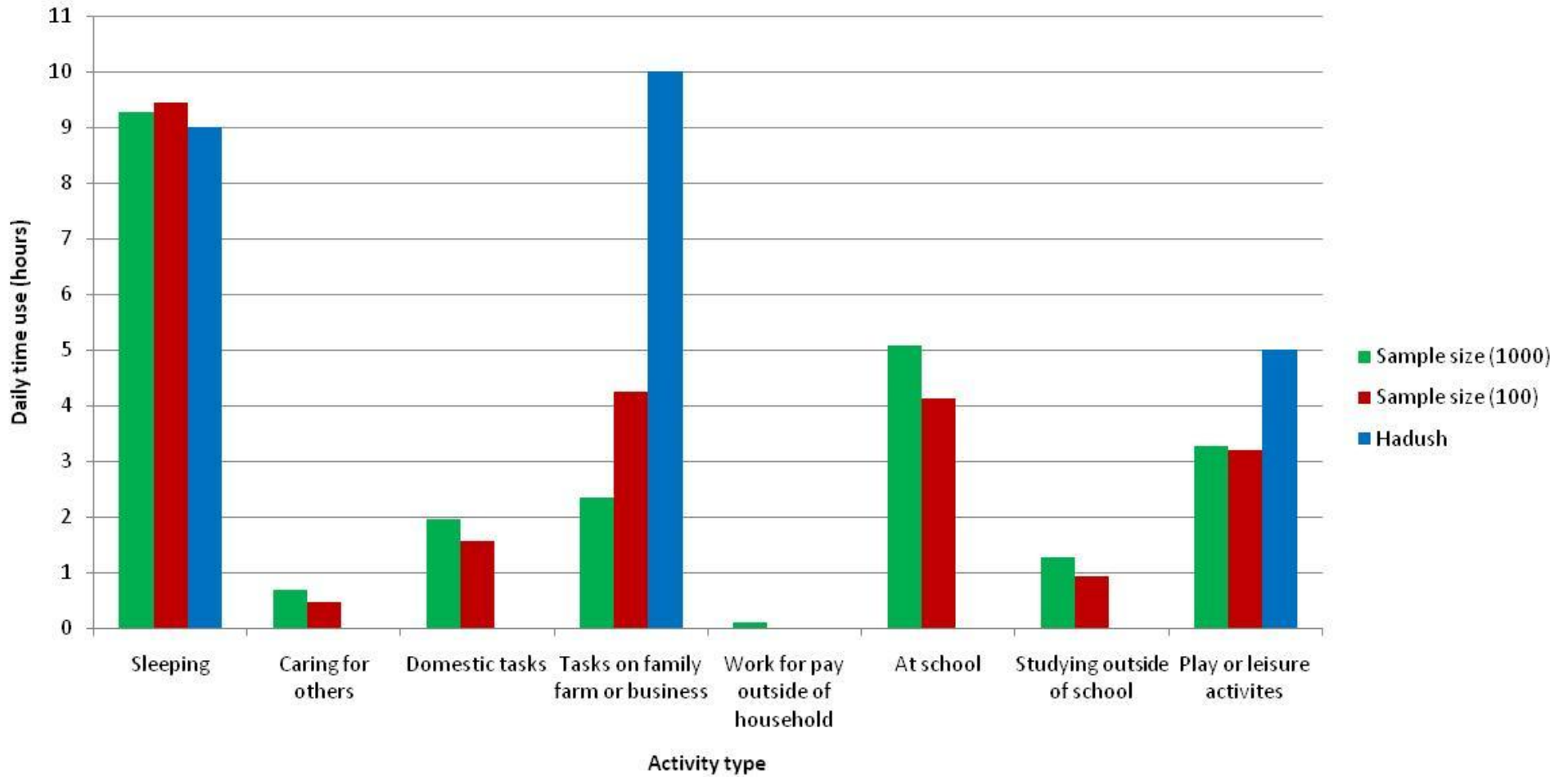
I am good at everything – nothing is impossible for me.



Photo credit: © Young Lives/Antonio Fiorente

Comparing sample size

Bar chart



Time use in Ethiopia – boys

Frequency distribution table

	0	1	2	3	4	5	6	7	8	9	10	11	12	Mean	Mode	Median
Time spent sleeping (hours)	0	0	0	0	0	0	0	2	37	67	81	12	1			
Time spent caring for others (hours)	146	39	14	1	0	0	0	0	0	0	0	0	0			
Time spent doing domestic tasks (hours)	48	75	52	19	4	1	0	1	0	0	0	0	0			
Time spent doing tasks on family farm or business (hours)	90	2	24	29	31	13	2	1	2	0	4	2	0			
Time spent working for pay outside of the household (hours)	194	1	2	1	1	0	0	0	0	0	0	0	1			
Time spent at school (hours)	14	0	0	0	2	85	48	25	17	8	1	0	0			
Time spent studying outside of school (hours)	27	74	75	21	2	1	0	0	0	0	0	0	0			
Time spent playing or doing leisure activities (hours)	0	12	43	51	33	30	16	11	3	1	0	0	0			

Time use in Ethiopia – boys

Completed frequency distribution table

	0	1	2	3	4	5	6	7	8	9	10	11	12	Mean	Mode	Median
Time spent sleeping (hours)	0	0	0	0	0	0	0	2	37	67	81	12	1	9.335	10	9
Time spent caring for others (hours)	146	39	14	1	0	0	0	0	0	0	0	0	0	0.35	0	0
Time spent doing domestic tasks (hours)	48	75	52	19	4	1	0	1	0	0	0	0	0	1.32	1	1
Time spent doing tasks on family farm or business (hours)	90	2	24	29	31	13	2	1	2	0	4	2	0	2.115	0	2
Time spent working for pay outside of the household (hours)	194	1	2	1	1	0	0	0	0	0	0	0	1	0.115	0	0
Time spent at school (hours)	14	0	0	0	2	85	48	25	17	8	1	0	0	5.57	5	5
Time spent studying outside of school (hours)	27	74	75	21	2	1	0	0	0	0	0	0	0	1.5	2	1
Time spent playing or doing leisure activities (hours)	0	12	43	51	33	30	16	11	3	1	0	0	0	3.695	3	3



Time use in Ethiopia – girls

Frequency distribution table

	0	1	2	3	4	5	6	7	8	9	10	11	12	Mean	Mode	Median
Time spent sleeping (hours)	0	0	0	0	0	0	1	4	34	76	64	19	2			
Time spent caring for others (hours)	115	32	40	12	1	0	0	0	0	0	0	0	0			
Time spent doing domestic tasks (hours)	7	32	72	55	27	4	3	0	0	0	0	0	0			
Time spent doing tasks on family farm or business (hours)	134	15	17	17	10	4	0	1	2	0	0	0	0			
Time spent working for pay outside of the household (hours)	197	1	1	1	0	0	0	0	0	0	0	0	0			
Time spent at school (hours)	7	0	0	0	6	98	42	22	20	5	0	0	0			
Time spent studying outside of school (hours)	16	80	80	22	2	0	0	0	0	0	0	0	0			
Time spent playing or doing leisure activities (hours)	0	25	44	44	44	26	9	5	1	1	1	0	0			



Time use in Ethiopia – girls

Completed frequency distribution table

	0	1	2	3	4	5	6	7	8	9	10	11	12	Mean	Mode	Median
Time spent sleeping (hours)	0	0	0	0	0	0	1	4	34	76	64	19	2	9.315	9	9
Time spent caring for others (hours)	115	32	40	12	1	0	0	0	0	0	0	0	0	0.76	0	0
Time spent doing domestic tasks (hours)	7	32	72	55	27	4	3	0	0	0	0	0	0	2.435	2	2
Time spent doing tasks on family farm or business (hours)	134	15	17	17	10	4	0	1	2	0	0	0	0	0.915	0	0
Time spent working for pay outside of the household (hours)	197	1	1	1	0	0	0	0	0	0	0	0	0	0.045	0	0
Time spent at school (hours)	7	0	0	0	6	98	42	22	20	5	0	0	0	5.625	5	5
Time spent studying outside of school (hours)	16	80	80	22	2	0	0	0	0	0	0	0	0	1.57	1,2	2
Time spent playing or doing leisure activities (hours)	0	25	44	44	44	26	9	5	1	1	1	0	0	3.335	2,3,4	3

Time use in Ethiopia – urban

Frequency distribution table

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	Mean	Mode	Median
Time spent sleeping (hours)	0	0	0	0	0	0	0	2	36	80	64	17	0	1			
Time spent caring for others (hours)	126	40	24	9	1	0	0	0	0	0	0	0	0	0			
Time spent doing domestic tasks (hours)	34	66	46	34	16	3	1	0	0	0	0	0	0	0			
Time spent doing tasks on family farm or business (hours)	164	8	14	11	2	0	0	1	0	0	0	0	0	0			
Time spent working for pay outside of the household (hours)	199	1	0	0	0	0	0	0	0	0	0	0	0	0			
Time spent at school (hours)	1	0	0	0	2	74	45	16	47	11	4	0	0	0			
Time spent studying outside of school (hours)	6	73	79	33	7	2	0	0	0	0	0	0	0	0			
Time spent playing or doing leisure activities (hours)	0	8	34	59	48	23	15	9	3	1	0	0	0	0			

Time use in Ethiopia – urban

Completed frequency distribution table

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	Mean	Mode	Median
Time spent sleeping (hours)	0	0	0	0	0	0	0	2	36	80	64	17	0	1	9.31	9	9
Time spent caring for others (hours)	126	40	24	9	1	0	0	0	0	0	0	0	0	0	0.595	0	0
Time spent doing domestic tasks (hours)	34	66	46	34	16	3	1	0	0	0	0	0	0	0	1.725	1	1.5
Time spent doing tasks on family farm or business (hours)	164	8	14	11	2	0	0	1	0	0	0	0	0	0	0.42	0	0
Time spent working for pay outside of the household (hours)	199	1	0	0	0	0	0	0	0	0	0	0	0	0	0.005	0	0
Time spent at school (hours)	1	0	0	0	2	74	45	16	47	11	4	0	0	0	6.375	5	6
Time spent studying outside of school (hours)	6	73	79	33	7	2	0	0	0	0	0	0	0	0	1.84	2	2
Time spent playing or doing leisure activities (hours)	0	8	34	59	48	23	15	9	3	1	0	0	0	0	3.73	3	3



Time use in Ethiopia – rural

Frequency distribution table

	0	1	2	3	4	5	6	7	8	9	10	11	12	Mean	Mode	Median
Time spent sleeping (hours)	0	0	0	0	0	0	1	6	39	70	68	15	1			
Time spent caring for others (hours)	118	42	33	4	3	0	0	0	0	0	0	0	0			
Time spent doing domestic tasks (hours)	28	46	60	42	21	3	0	0	0	0	0	0	0			
Time spent doing tasks on family farm or business (hours)	57	19	25	32	42	11	5	1	3	0	2	2	1			
Time spent working for pay outside of the household (hours)	197	0	2	1	0	0	0	0	0	0	0	0	0			
Time spent at school (hours)	14	0	0	0	4	97	63	17	4	1	0	0	0			
Time spent studying outside of school (hours)	35	87	64	11	1	1	0	0	0	1	0	0	0			
Time spent playing or doing leisure activities (hours)	1	28	47	50	43	21	4	6	0	0	0	0	0			



Time use in Ethiopia – rural

Completed frequency distribution table

	0	1	2	3	4	5	6	7	8	9	10	11	12	Mean	Mode	Median
Time spent sleeping (hours)	0	0	0	0	0	0	1	6	39	70	68	15	1	9.235	9	9
Time spent caring for others (hours)	118	42	33	4	3	0	0	0	0	0	0	0	0	0.66	0	0
Time spent doing domestic tasks (hours)	28	46	60	42	21	3	0	0	0	0	0	0	0	1.955	2	2
Time spent doing tasks on family farm or business (hours)	57	19	25	32	42	11	5	1	3	0	2	2	1	2.515	0	2
Time spent working for pay outside of the household (hours)	197	0	2	1	0	0	0	0	0	0	0	0	0	0.035	0	0
Time spent at school (hours)	14	0	0	0	4	97	63	17	4	1	0	0	0	5.195	5	5
Time spent studying outside of school (hours)	35	87	64	11	1	1	0	0	0	1	0	0	0	1.33	1	1
Time spent playing or doing leisure activities (hours)	1	28	47	50	43	21	4	6	0	0	0	0	0	3.075	3	3

