Research Study No.4. ABSTRACT Sugar direct consumption of different population groups in Myanmar NyoNyoAung¹, Yi Yi Mon² and San Thein³

Sugar is one of the strategic goods in the basket of households in each country and it plays animportant role in supplying the required energy. Sugar industry is one of the important industries in Myanmar. It is important not only for direct consumption and industrial use but also for potential export item. However, Myanmar sugar industry do not have accurate information both consumption and production data. There is no systematic study on sugar consumption in Myanmar .Therefore, it is needed to get empirical based per capita sugar consumption data for setting up sugar industry development strategy.

The research aim is to determine the per capita sugar consumption of different population groups andTo compare the sugar consumption levels of different population groups. Nationwide survey for direct sugar consumption was undertaken by Sugarcane Crops Division, Department of Agriculture during (1.2.2019) to (15.2.2019). Enumerator training on sugar direct consumption survey conducted on 28 January 2019 at Naypyitaw. This survey covers 14 regions and states plus Naypyitaw council. 4860 respondents were randomly selected with probability proportion to size from the total number of population in respective regions and states. Thus 4860 respondents were stratified into first, rural and urban areas, second male and female respondents and third level is split into three age groups. The study design was a descriptive research. Surveyed data were analyzed by using SPSS version 20.0.

The average per capita sugar consumption of Union level was 7.686 kg/year and daily sugar consumption was 21.06 gm. Sugar consumption levels of different population groups were varied. Sugar consumption of male respondents was 6.7 % greater than that of female. In age groups, sugar consumption of young people(<14 years)was 16 % and 28 % greater than that of medium aged(15-64 years) and old people(>65 years) respectively. It also found that sugar consumption levels of different job types were ranging from 6.8 kg to 8.9 kg. Sugar consumption of high income levels were higher than that of lower income levels. It was ranged from 7 kg to 10 kg.Mean sugar intake among different groups ranged from 18.39 to 23.48 gm/day, with young age group aged > 14 years having the highest intake. However, the average sugar intake rate per day was not exceeded the WHO recommendation 50 grams/day.

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Sugar direct consumption of different population groups in Myanmar NyoNyoAung¹, Yi Yi Mon² and San Thein³

Introduction

Sugar is one of the strategic goods in the basket of households in each country and it plays animportant role in supplying the required energy. In Myanmar, sugar industry is one of the important industries. It is important not only for direct consumption and industrial use but also for potential export item. Myanmar sugar industry do not have accurate information both consumption and production data. Sugar direct consumption and industrial consumption are major sugar demand side. Understanding the dynamics and structure of sugar consumption is vitally important in assessing the future of the sugar economy. Therefore, consumption study is used to conduct in world sugar producing countries, in contract; there is no systematic study on sugar direct consumption in Myanmar. Per capita sugar availability was indirectly estimated by calculating the data of sugar production, import and export. To secure information on sugar consumption per capita, three methods can be followed: (i) by determining in a country the total amount available both for consumption and industrial use and dividing the figure by the total population;(ii)by determining the consumption in households using a questionnaire, and then dividing the amount by the number of members, in term of man-units; and(iii)by determining the consumption of individuals, using one questionnaire for each member. The sugar intake from common food sources in this survey were sweetened soft drinks, traditional desserts, table sugar, beverages, and confectionery.

Objectives of the study

- (1) To estimate sugar direct consumption per capita by different consumer groups and
- (2) To compare the sugar consumption levels of different population groups.

Materials and Methods

Sugar direct consumption survey was conducted by Sugar Crops Division (SCD), Department of Agriculture during (1.2.2019) to (15.2.2019). This survey covers 14 regions and states plus Naypyitaw council.4860 respondents were randomly selected with probability proportion to size from the total number of population in respective regions and states. Thus 4860 respondents were stratified into first, rural and urban areas, second male and female respondents and third level is split into three age groups. Data will be disaggregated with respect to urban/rural, age, sex based on population data of 2014 Census. Determination of sample size for sugar consumption estimate was based on the following statistical principle.

Z value for 95 % = 1.96

 σ is unknown. σ will be estimated in ¹/₄ range. This estimate is derived from the empirical rule which states that approximately 95 % of the values in a normal distribution fall within +/- σ of the mean, giving a range within which most of the values fall. It is assumed to be 0 to 15 kg.

n = 54 will be doubled, each at three- stage sampling (urban and rural; male and female; three age groups.

Hence, $54 \times 2 = 162$. Again, $162 \times 2 = 324$. The sample size (324) will be allocated to each region or state of the country.

Hence, 324 X 15 (14 R/S plus Naypyitaw Council Area) = 4860.

Per capita sugar consumption was estimated in proportion to the 2014 population census. Thus 4860 respondents were randomly selected with probability proportion to size from the total number of population in respective regions and states.2014 Population census is 51,486,253 derived from enumerated value (50,279,900) + estimated value (1,206,353) for the whole country. The enumerated population figure (51486253) will be used.By sex ratio (0.48 male to 0.52 female), male population is 24,228,714 and female population is 26,051,186 out of total enumerated value of 50,279,900.By age group, 0 - 14 constitutes 28.6 %, 15 to 64 represents 65.6% and 65 and above group 5.8%. Thus 4860 respondent sample size were stratified into first, rural and were partitioned in proportion to the population of large cities and towns. Third, the number of respondents (XXX) in each of large cities are allocated in proportion to the population size. Fourth, respondents will be randomly selected in each allocated site. The same procedure of respondent sample allocation is applied to ordinary towns.

For rural areas, two clusters were segregated such as rural villages near by market places and remote rural villages. Remote villages could be ascribed as far from the highway, or difficult access to district to district and township to district communication networks. Remote villages may exist in the interior site close to the boundary of the township and is not close to the market place of other adjoining township boundary. Number of sample allocation is determined based on the distribution pattern of the villages in each administrative boundary. It will be based on the list of towns, village tracts and villages in Myanmar.

Enumerators training on sugar direct consumption survey conducted by Sugar Crops Division, Department of Agriculture on 28 January 2019 at Naypyitaw. Selected townships of each state and region were shown in Area map of sugar direct consumption survey (<u>Appendix</u> <u>1</u>).Sugar amounts contained in foodstuffs were calculated from information given in <u>Appendix 2</u>.

Results and Discussions

(a)Number of respondents

Sugar direct consumption survey was conducted by Sugar Crops Division (SCD), Department of Agriculture at 34 selected townships in different states and regions during (1.2.2019) to (15.2.2019).According to the survey data, 4860 respondents were selected for sugar direct consumption survey (Table-1).

Urban areas	= total respond	dents	Rural areas = Total respondents				
(1408	B) (29.59%)	(3452) (70.41 %)					
sex	Age group	Number	sex	Age group	Number		
Male(47.82%)	0-14	189	Male(48.34%)	0-14	471		
Male	15-64	430	Male	15 - 64	1090		
Male	65 & above	41	Male	65 & above	97		
Female(52.18%)	0-14	216	Female(51.66%)	0-14	514		
	(28.64%)						
Female	15 - 64	488	Female	15 - 64	1177		
	(65.59%)						
Female	65 & above	44	Female	65 & above	105		
	(5.76%)						

Table 1. Number of respondents by different population groups

Number of respondents by resident, gender and age groups in different areas was shown in <u>Appendix 3</u>.

(b)Per capita sugar consumption of different population groups

Per capita sugar consumption of different population groups was shown in Table 2. The average per capita sugar consumption of union level was 7.686 Kg/year. It is found that sugar consumption was varied between selected groups; gender and age groups.

States/	Mean per capita direct sugar consumption by /Gender/Age Groups(gm)									
States	Ge	nder		Age Groups		Mean				
Regions	Male	Female	< 14 years	15-64 years	> 65 years	(gm)				
Kachin	7556	7068	7373	7400	6961	7304				
Kayah	6657	6469	6349	6547	7133	6526				
Kayin	7385	6848	6724	7413	5338	7105				
Chin	4267	2057	2941	3227	2799	3122				
Sagaing	8670	8923	9661	8524	7713	8803				
Tanintharyi	11932	11077	13052	10505	13845	11436				
Bago	10601	10089	10180	10380	10412	10326				
Magway	4842	4551	6891	4022	2471	4690				
Mandalay	6718	6663	10315	5559	2183	6660				
Mon	8528	8009	9795	7586	8406	8257				
Rakhine	9897	8750	9469	9126	9742	9261				
Yangon	10362	12548	12290	11521	7321	11499				
Shan	7275	5505	7419	6014	4734	6353				
Ayeyawady	6902	6975	7870	6574	6523	6940				
Naypyitaw	7788	6302	8215	6663	5097	7012				
Union	7959	7456	8570	7404	6712	7686				

Table 2.Average per capita sugar consumption of different population groups

According to the Table 2, annual per capita sugar direct consumption for male respondents was 6.7 % greater than that of female. Per capita sugar direct consumption for male consumers was 7.959 kg/year that of female respondents was 7.456 kg/year. For age groups, sugar consumption of young people(<14 years)was 16 % and 28 % greater than that of medium aged(15-64 years) and old people(>65 years) respectively. Per capita sugar direct consumption of youngconsumers (<14 years)was 8.570 kg/year that ofmedium aged(15-64 years) and old consumers (>65 years) were 7.404 kg/year and 6.712kg/year respectively. Mean sugar direct consumption of selected groups were illustrated in Figure 1,2.



Figure 1. Mean sugar direct consumption by gender (gm)

Figure 2. Mean sugar direct consumption by aged groups (gm)



The detail statistics of per capita sugar consumption by different states and regions was shown in <u>Appendix 3</u>.

(c) Per capita sugar consumption by job types

It was also found that sugar direct consumptions were different based on job types and income levels of consumers. Eight groups of job types were divided to the sample respondents. Sugar consumption of company staffs, business man and students were higher than that of dependent, farmer and labor. Sugar consumption of different job types were shown in Table 3 and Figure 3.

Stato		Mean per capita sugar consumption by job types (gm)											
Region	Student	Govorn Staff	Business	Company Staff	Labor	Farmer	Dependent	Others	Mean/yr				
Kachin	7398	6101	7732	2306	10158	8046	5615	7108	7304				
Kayah	6620	10249			6412	4588	7525	7398	6526				
Kayin	7293	6998	9062	10183	10158	6538	5272	7976	7105				
Chin	3146	3296	4059	1104	4704	2938	2880	6576	3122				
Sagaing	9503	8503	8809		6949	9808	5051	7154	8803				
Thninthari	13323	10885	11553	12936	11046	10616	9738	10525	11436				
Bago	9457	15050	13228	10391	6782	8498	11990	11393	10326				
Magway	6735	4380	4230	5605	4108	3276	4271	4646	4690				
Mandalay	9442	6709	10031	8402	4081	3878	3485	3540	6660				
Mon	9495	7001	12942		7923	7096	9319	3631	8257				
Rakhine	9399	10790	13867	12960	8368	8339	7152	9598	9261				
Yangon	12842	9827	10761	13055	8013	13371	11467	12087	11499				
Shan	6602	8048	5028	10912	2832	4493	6035	8601	6353				
Ayeyawady	6673	7926	8580	10538	6853	5818	6510	9449	6940				
Naypyitaw	8094	7538	6051	7368	7642	6200	5873	7801	7012				
Mean/year	8401	8220	8995	8813	7069	6900	6812	7832	7686				
Mean/day	23.02	22.52	24.64	24.15	19.37	18.90	18.66	21.46	21.06				

 Table 3.Mean per capita
 sugar consumption by job types

Figure 3.Mean per capita sugar consumption by job types (gm)



(d) Per capita sugar consumption by income levels

It was found that sugar consumption was affected by the income levels of consumers. Six groups of income levels were divided to the sample respondents. Sugar consumption of different income levels were shown in Table 4 and Figure 4.

	Mean per capita total sugar consumption by income levels (gm)										
State/Region	> 1000001	500001- 1000000	300001- 500000	150001- 300000	<150000	Dependent	Mean/yr				
Kachin	10179	12050	6700	7736	7053 6958		7304				
Kayah	6889	3542	5944	8563	5354	7247	6526				
Kayin			7272	7651	7668	6554	7105				
Chin	5080	6960	2592	2553	3032	2963	3122				
Sagaing	7487	19300	11055	9410	8622	8365	8803				
Thninthari	13788	13817	11223	11207	10023	11839	11436				
Bago	28928	14262	14299	10843	9915	9656	10326				
Magway	4032	6272	6449	3966	3310	6078	4690				
Mandalay	6365	3969	8147	5751	4897	7966	6660				
Mon	7488		7488	7365	6564	9433	8257				
Rakhine	7295		6528	9115	12473	8346	9261				
Yangon	9451	15732	15406	11185	8872	12190	11499				
Shan		6000	10881	8991	3571	6412	6353				
Ayeyawady	12374		11011	7097	8117	6186	6940				
Naypyitaw	6444	8194	7758	6104	6912	8916	7012				
Mean/year	9677	10190	8850	7836	7092	7941	7686				
Mean/day	26.51	27.92	24.25	21.47	19.43	21.76	21.06				

 Table 4.Mean per capita sugar consumption by income levels (gm)

Figure 4.Mean per capita sugar consumption by income levels (gm)



As shown in Figure 4, sugar consumption of high income levels were higher than that of lower income levels.

(e) Daily sugar direct consumption

In this study, wide range of sugar intakes seen in all groups studied. The daily sugar direct consumption was ranged from 8.55 grams to 31.50 grams. The union daily sugar consumption was 21.06 gm. The statistic show that daily sugar consumption of a American was 126.40 grams and that of German was 102.9 grams in 2016. The American Heart Association (AHA) recommends the maximum amount of sugar an average person should eat in a day is: Men: 35 grams or 9 teaspoons and Women: 24 grams or 6 teaspoons. The recommendation of daily sugar intake by World Health Organization (WHO) was roughly 50 grams of sugar for someone of normal weight. Daily sugar direct consumption / one person by gender and age groups were shown in Figure 5 and Figure 6.



Figure 5.Daily sugar direct consumption by gender(gm)

Figure 6.Daily sugar direct consumption by age groups(gm)



Daily sugar direct consumption / one person by gender and age groups were shown in Figure 7 and Figure 8.Among the consumers, daily sugar consumption of different jobs and income groups was different from each other.Sugar consumption of company staffs, business

man and students were higher than that of dependent, farmer and labor.Sugar consumption of high income levels were higher than that of lower income levels.



Figure 7.Daily sugar direct consumption by job types (gm)

Figure 8.Daily sugar direct consumption by income levels (gm)



Conclusion

Historically, sugar consumption per capita in Thailand reached an all time high of 35.5 kg in 2011 and an all time low of 2.10 kg in 1963. When compared to Thailand's main peers, sugar consumption per capita in Cambodia amounted to 16.8 kg, 4.30 kg in Laos, 38.8 kg in Malaysia and 0.300 kg in Myanmar in 2013(Kriengsinyos*et all* 2018). There is no

evidence to accurately establish the level of sugar intake in Myanmar. According to this survey, the average per capita sugar consumption of Myanmar was 7.686 kg/year and daily sugar consumption was 21.06 gm. As the first national sugar consumption survey, there are some limitations in the methods to estimate sugar intake in different food sources.

The results seem plausible and consistent with theory and show that sugar direct consumption was is associated with resident, gender, age and incomes .There are two kinds of sugar demand, which are industrial and nonindustrial demand.Knowledge on sugar demand patterns of a Myanmar is useful for sugar strategy and sugar law formulations.

References

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Appendix (1)



Sugar direct Consumption Survey (2019) Area Map

Sugar contents of some foods, soft drinks and beverages

Sr	Product	Brand	Sugar contents gm/ unit
	Foreign Foods Stuffs		
1	Cake	Fudo	1.5 g
2	11	Choco Pie	0.92 g
3	Jelly	YoYo	0.52 g
4	Cocalate	Tango 100 g	48.2 g
	Domestic Foods Stuffs		<u> </u>
5	Cake	Nan-Sein	6 g
6	Biscuits	Thazin	0.21 g
7	Cookies	Milk Flavour	0.81 g
8	Jelly	May May	0.68 g
9	Candy	Guava	0.64 g
10	Bubble gum	Mentos	2 g
11	Bread	Good Morning	1.5 g
	Traditional Foods Stuffs	1	
12	ကျောက်ကျော		10.12 g
13	ရွှေရင်အေး		8 g
14	မုန့်ဖက်ထုပ်		4 g
15	သကြားပေါက်စီ		4 g
16	ဟာလဝါ		16 g
17	ထိုးမုန့်		16 g
18	လမုန့်		10 g
	Beverage Domestic Drinks		
19	Coffee Mix	Nescafe	10 g
20	11	Rich	12 g
21	Ш	Gold Roast	11.2 g
22		Sunday	17 g
23	Tea Mix	Royal Myanmar	12.3 g
24	Ш	Myanmar Tea	12 g
25	Ш	Lemon Tea	17 g
26	Fruit Drink	Juicy(750ml)	352.5 g
27	Ш	Oscar(1000ml)	650 g
28	ဆိုင်ဖျော်(Tea)	ချို့စိုမ့်	4 g
29	II	ပေါ့စိမ့်	2 g
30		ပုံမှန်	2 g
	Soft Drinks		<u> </u>
34	Soft Drinks	Coca cola	33 g
35	11	Speed	42.4 g
36	11	Shark	38 g
27		VoVo Asia	20 ~
38		Max +	<u>20 g</u> 30 g

39	Ш	ဖါလူဒါ	20 g
40	Ш	Ice- cream	20 g
41	Ш	cheese	12 g
42	II	Milk	5 g
	One teaspoon of sugar		4 g

Appendix (3) Number of respondents by resident, gender and age groups in different areas

G	States/	Townshi	ľ	Ma	ile		Female			Toto	
Sr	Dogiona	Number	< 14	15-64	> 65	Total	< 14	15-64	> 65	Total	10ta 1
•	Regions	Number	yrs	yrs	yrs	Total	yrs	yrs	yrs	Total	1
1	Kachin	4	83	187	20	290	89	204	17	310	600
	Urban		20	40	6	66	19	46	4	69	135
	Rural		63	147	14	224	70	158	13	241	465
2	Kayah	1	20	45	5	70	22	49	5	76	146
	Urban		5	12	2	19	6	13	1	20	39
	Rural		15	33	3	51	16	36	4	56	107
3	Kayin	2	47	106	8	161	52	114	9	175	336
	Urban		4	7	0	11	5	8	0	13	24
	Rural		43	99	8	150	47	106	9	162	312
4	Chin	1	23	53	4	80	24	56	6	86	166
	Urban		2	5	0	7	2	5	1	8	15
	Rural		21	48	4	73	22	51	5	78	151
5	Sagaing	3	64	147	14	223	70	159	15	244	467
	Urban		11	25	1	37	12	27	3	42	79
	Rural		53	122	13	186	58	132	12	202	388
6	Tanintharyi	2	34	74	6	114	47	103	8	158	272
	Urban		10	21	1	32	20	45	4	69	101
	Rural		24	53	5	82	27	58	4	89	171
7	Bago	3	56	131	11	198	61	142	14	217	415
	Urban		19	45	4	68	20	49	5	74	142
	Rural		37	86	7	130	41	93	9	143	273
8	Magway	2	41	97	8	146	45	104	9	158	304
	Urban		8	19	2	29	9	21	2	32	61
	Rural		33	78	6	117	36	83	7	126	243
9	Mandalay	3	49	121	12	182	57	128	12	197	379
	Urban		25	60	6	91	29	64	6	99	190
	Rural		24	61	6	91	28	64	6	98	189
10	Mon	1	15	34	2	51	16	37	3	56	107
	Urban		12	27	2	41	13	29	2	44	85
	Rural		3	7	0	10	3	8	1	12	22
11	Rakhine	2	38	90	9	137	42	97	9	148	285
	Urban		11	27	3	41	13	29	1	43	84
	Rural		27	63	6	96	29	68	8	105	201
12	Yangon	4	64	149	14	227	70	161	13	244	471
	Urban		36	83	9	128	40	89	8	137	265
	Rural		28	66	5	99	30	72	5	107	206
13	Shan	2	41	90	8	139	43	100	9	152	291
	Urban		11	24	2	37	12	27	2	41	78
	Rural		30	66	6	102	31	73	7	111	213
14	Ayeyawady	2	39	91	8	138	43	98	9	150	288

	Urban		11	26	2	39	12	27	3	42	81
	Rural		28	65	6	99	31	71	6	108	207
15	Naypyitaw	2	46	105	9	160	49	113	11	173	333
	Urban		4	9	1	14	4	9	2	15	29
	Rural		42	96	8	146	45	104	9	158	304
	Union	34	660	1520	138	2316	730	1665	149	2544	4860
	Urban		189	430	41	660	216	488	44	748	1408
	Rural		471	1090	97	1656	514	1177	105	1796	3452

Detai	il statistics	of per cap	ita sugar (consumpt	tion by dif	ferent state	es and reg	Appendix ions	x (4)
<u> </u>		Mean su	igar dire	ct consun	nption/yea	r/individua	al(gm)		
State		Ma	le		1	Fem	ale		Mean
	< 14	15-64	> 65		< 14	15-64	> 65		ĺ
/Regions	yrs	yrs	yrs	Total	yrs	yrs	yrs	Total	
Kachin	, v	- V	· · ·		v				7304
Urban	5206	6851	9004	6549	6721	5669	3996	5862	6197
Rural	7884	8112	4979	7852	7709	7381	6220	7413	7625
Kayah									6526
Urban	9147	9794	8542	9533	7483	11572	5911	9796	9648
Rural	6658	4077	13716	5311	4761	5893	3441	5412	5367
Kayin									7105
Urban	10543	6598		8033	9780	5536		7168	7564
Rural	7097	7601	5360	7337	5733	7432	5319	6822	7070
Chin									3122
Urban	2988	5424		5413	1416	4512	3624	3627	4460
Rural	3264	4445	4794	4156	2802	1565	1039	1896	2989
Sagaing									8803
Urban	8120	4926	4907	5875	4611	5569	8211	6255	6077
Rural	9967	8952	8724	9232	9978	9404	7881	9978	9360
Taninthayi									11436
Urban	12938	8444	11760	9952	11812	10686	12849	11138	10762
Rural	13236	12144	16103	12705	13850	9614	12540	11031	11833
Bago									10326
Urban	8314	13601	14116	12232	7935	12268	6720	10722	11528
Rural	10148	9231	12415	9714	11879	8865	9175	9695	9704
Magway	(10.1	1205	2102	40.4.4	0000	2440	05.60	5022	4690
Urban	6134	4395	2192	4844	8988	3440	8562	5023	4935
Rural	6640	3852	1420	4437	6912	4282	1821	4841	4628
Mandalay	14215	7126	2056	0050	11100	8007	2674	9564	000U 9704
Urban Dural	14315	2520	3030	8838	7660	8007	2074	8304	8/04
Kurai	8020	5550	1/89	4001	/000	3038	1215	4032	4027
Urbon	11026	7402	0200	8712	9621	8720	9520	8600	0457 9720
Dural	0544	6840	0200	0742	6012	5004	6332	5/99	6467
Rulai	7344	0840		7031	0912	5004		5461	0407
Urban	10658	13402	11116	12487	10272	8762	1728	8964	10530
Rural	0004	8870	10672	0025	0305	8702	0707	8678	8833
Vangon	9004	0070	10072	9025	9303	0291	9101	0070	11499
Urban	10633	96/18	9302	9895	13576	12132	7/68	12313	111/1
Rural	12923	10851	5227	11183	12018	13892	3673	12938	12111
Shan	12725	10051	5221	11105	12010	13072	5075	12750	6353
Urban	13411	11870	4032	11904	10958	5452	14796	7519	9599
Rural	6134	5390	3992	5545	5166	4757	2858	4734	5123
Avavawadv	0157	5570	5772	5575	5100	ונוד	2000	- 7, 3-	6940
Urban	13501	9193	13147	10611	9141	8797	10784	9037	9795
Rural	6252	5210	4318	5441	6842	6007	4405	6172	5823
ixuiui	0232	5210	-510	1771	0072	0007	105	0172	5625

Naypyitaw									7012
Urban	15147	7727	2664	9621	8036	7471	3744	7147	8256
Rural	7696	7544	8220	7625	8099	5690	2891	6217	6893
Union	9245	7769	7561	8212	8337	7345	6135	7593	7686
Urban	10193	8427	7855	8970	8698	7907	7114	8122	8528
Rural	8298	7110	7266	7454	7975	6783	5156	7064	7230

Photos of sugar direct consumption survey at states & regions



