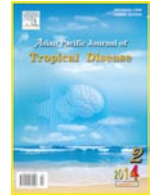




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## Prevalence of intestinal parasites in Lorestan Province, West of Iran

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## ABSTRACT

**Objective:** To study the prevalence of intestinal parasites in Lorestan Province, West of Iran.**Methods:** This cross-sectional study was conducted on 2838 stool samples in Khorramabad, Lorestan Province in 2013. Samples were examined by the several techniques.**Results:** The frequency of intestinal parasites was 465 (16.4%) of which 188 (13.5%) samples were for urban areas and 277 (19.2%) for rural areas. Infection in rural areas was significantly higher than urban areas. Out of 465 infected samples, 456 (98%) were contaminated with protozoan parasites and 9 (2%) with helminthes. Infection in people who sometimes used the soap to wash hands was significantly more than those who always used soap ( $P<0.001$ ). Infection in people with poor economic conditions was significantly more than the two groups with moderate and good economic conditions ( $P<0.001$ ).**Conclusions:** Effective reasons for the reducing incidence of intestinal parasites in Lorestan Province could be the development of universities with more students led to increased awareness, improvement of the environment, increase of the ease of access to health care centers, increase of advertising in provincial mass media about health training, increased health culture, and dispose of sanitary waste properly.

## 1. Introduction

One of the most common infections in the world is intestinal parasites since about one-third of people has these infections which causes numerous symptoms especially in young children<sup>[1]</sup>. Despite the effort and extensive programing of the World Health Organization, the prevalence of intestinal parasites has caused economic, social and health losses<sup>[2]</sup>. The prevalence of these parasites in different regions is different as environmental, economic, regional, political and cultural habits and social factors have a significant role in their prevalence<sup>[3,4]</sup>. For example, lack of access to clean water, poor sanitation, economic

poverty, high population density, living in the tropics and unexpected events such as earthquakes and floods can increase the risk of parasitic infection<sup>[5]</sup>.

Parasitic infections in patients especially children are associated with poor growth, physical weakness and loss of academic progress<sup>[4,6]</sup>. It is believed that improving living conditions could be effective in reducing the prevalence of parasites<sup>[4]</sup>. Zoonotic parasites stored in the animals as reservoir host. Special attention should be paid on these hosts to control parasites<sup>[7]</sup>. Collecting the epidemiological data, such as the prevalence of intestinal parasitic infections in different regions, is a useful prerequisite for planning and controlling of parasitic infections<sup>[8]</sup>. Iran is located in the south of Caspian Sea, west of Afghanistan, the east of Iraq and north of Persian Gulf. The weather in north and south of Iran is temperate and subtropical, respectively.

The prevalence of parasites in this country is diversity because of various weather conditions, diversity of cultures

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and traditions in different regions of Iran[9]. The purpose of this study was to investigate the prevalence of intestinal parasites in Lorestan Province, Iran.

## 2. Materials and methods

### 2.1. Study area

This study was carried out in Khorramabad City, Lorestan Province, West of Iran, located between latitudes 32° 30' and 48°1' N and longitudes 55°17' and 61° 15' E. Long-term annual mean temperature and precipitation are 17.07 °C and 580 mm, respectively. The weather and climate of Lorestan Province have a variation. This province is classified as a region with a semi-arid climatic condition. The total area of the province is 28064 km<sup>2</sup> and the total cultivated area of barley is about 138978 ha consisting of 9029 ha of irrigated and 129949 ha dry land barley[10].

Lorestan Province has a total population of 1 754 243, including 883 693 males and 870 550 females. About 1 075 951 people, including 536 589 males and 539 362 females, live in urban areas and 677 416 people, including 346 653 males and 330 763 females, live in rural areas[11].

### 2.2. Feces collection and analysis

This cross-sectional study was conducted in 2013. Samples were collected using multi-stage random cluster sampling. The trained people were chosen for the completion of the questionnaires and collection of the samples. Stool samples were collected in stool container and transported to the laboratory of parasitology.

Samples were examined by the techniques including direct wet-mount, Lugol's iodine staining, formaldehyde-ether sedimentation, agar culture and Trichrome staining.

### 2.3. Statistical analysis

Results were statically examined by using SPSS software, version 17. *Chi*-square test at the 5% level was used to assess the relation between the prevalence of intestinal parasites and qualitative variables. Differences were considered significant when *P* value was less than 0.05.

## 3. Results

The frequency of intestinal parasites in 2838 stool samples

was 465 (16.4%) of which 188(13.5%) samples were for urban areas and 277 (19.2%) for rural areas.

Infection in rural areas was significantly higher than urban areas ( $P<0.001$ ).

The results showed that contamination with pathogenic and non-pathogenic parasites were 203 (43.6%) and 262 (56.4%), respectively.

The prevalence of intestinal parasites in cities studied of Lorestan Province, Iran is reported in Table 1 in details.

**Table 1**

Prevalence of intestinal parasites in cities of Lorestan Province, West of Iran, in 2013.

City	Parasite	No. of parasites detected [n (%)]	Total number of tests	Frequency of positive cases [n (%)]
Aleshtar	<i>B. hominis</i>	3 (1.80%)	167	25 (15.0%)
	<i>I. butschlii</i>	2 (1.50%)		
	<i>G. lamblia</i>	10 (6.00%)		
	<i>E. coli</i>	8 (4.80%)		
	<i>Trichomonas hominis</i>	1 (0.60%)		
	<i>Trichuris trichiura</i>	1 (0.60%)		
	Aligudarz	<i>B. hominis</i>		
<i>I. butschlii</i>		3 (1.10%)		
<i>E. coli</i>		20 (7.50%)		
<i>G. lamblia</i>		23 (8.70%)		
<i>E. nana</i>		5 (1.90%)		
<i>Chilomastix mesnili</i>		2 (0.80%)		
<i>E. histolytica/E. dispar</i>		2 (0.80%)		
Azna	<i>G. lamblia</i>	7 (4.00%)	173	7 (4.0%)
Broujerd	<i>B. hominis</i>	110 (19.00%)	582	161 (27.7%)
	<i>I. butschlii</i>	15 (2.60%)		
	<i>E. coli</i>	15 (2.60%)		
	<i>G. lamblia</i>	16 (2.70%)		
	<i>E. nana</i>	2 (0.34%)		
	<i>H. nana</i>	2 (0.34%)		
	<i>E. histolytica/E. dispar</i>	1 (0.17%)		
Doroud	<i>B. hominis</i>	3 (1.20%)	241	27 (11.0%)
	<i>I. butschlii</i>	2 (0.80%)		
	<i>E. coli</i>	4 (1.70%)		
	<i>G. lamblia</i>	14 (5.80%)		
	<i>Enterobius vermicularis</i>	1 (0.40%)		
	<i>H. nana</i>	2 (0.80%)		
	<i>E. histolytica/E. dispar</i>	1 (0.40%)		
Khorramabad	<i>E. coli</i>	12 (2.20%)	535	52 (9.7%)
	<i>G. lamblia</i>	20 (3.70%)		
	<i>E. histolytica/E. dispar</i>	1 (0.20%)		
	<i>Strongyloides stercoralis</i>	2 (0.20%)		
	<i>H. nana</i>	2 (0.20%)		
	<i>I. butschlii</i>	3 (4.30%)		
	<i>Trichomonas hominis</i>	1 (0.20%)		
	<i>E. nana</i>	1 (0.20%)		
	Kouhdasht	<i>Giardia lamblia</i>		
<i>B. hominis</i>		1 (0.33%)		
Nourabad	<i>G. lamblia</i>	16 (10.40%)	154	27 (17.5%)
	<i>Chilomastix mesnili</i>	5 (3.20%)		
	<i>E. histolytica/E. dispar</i>	6 (3.90%)		
Poldokhtar	<i>G. lamblia</i>	40 (20.70%)	193	56 (25.4%)
	<i>E. histolytica/E. dispar</i>	7 (3.00%)		
	<i>E. coli</i>	2 (1.03%)		
Sepid dasht	<i>B. hominis</i>	6 (6.30%)	96	29 (30.2%)
	<i>I. butschlii</i>	1 (1.00%)		
	<i>E. coli</i>	2 (2.10%)		
	<i>G. lamblia</i>	18 (18.80%)		
	<i>E. nana</i>	1 (1.00%)		
	<i>E. histolytica/E. dispar</i>	1 (1.00%)		

*B. hominis*: *Blastocystis hominis*; *I. butschlii*: *Iodamoeba butschlii*; *G. lamblia*: *Giardia lamblia*; *E. coli*: *Entamoeba coli*; *E. nana*: *Endolimax nana*; *E. histolytica*: *Entamoeba histolytica*; *E. dispar*: *Entamoeba dispar*; *H. nana*: *Hymenolepis nana*.

Out of 465 infected samples, 456 (98%) were contaminated with protozoan parasites and 9 (2%) with helminthes (Table 2). Also, 432 (15.2%) samples were infected with one parasite and 33 (1.2%) with more than one parasite.

**Table 2**

Prevalence of intestinal parasites according to epidemiological factors observed in Lorestan Province, west of Iran, in 2013.

Variable	No. of samples	Frequency of contamination [n (%)]	P value	
Gender	Male	1197	188(15.7%)	0.37
	Female	1564	254(16.2%)	
Level of education	Low literate	1864	338(18.1%)	0.01
	Diploma	441	57(12.9%)	
	Academic degree	145	18(12.4%)	
Age group (years)	<10	578	82(14.2%)	0.17
	10–19	584	118(20.2%)	
	20–29	478	78(16.3%)	
	30–39	445	70(15.7%)	
	40–49	301	46(15.3%)	
	50–59	204	33(16.2%)	
	≥60	172	25(14.5%)	
Use of soap	Sometimes	917	193(21%)	<0.001
	Always	1824	254(13.9%)	
Wash the vegetables	Leading detergent and lotions	82	10(12.2%)	0.19
	Other ways	2635	434(16.5%)	
Location	Urban	1394	188(13.5%)	<0.001
	Rural	1444	277(19.2%)	
Economic situation	Well	128	16(12.5%)	<0.001
	Average	911	117(12.8%)	
	Poor	1352	250(18.5%)	

There were 188 (15.7%) samples for men and 254 (16.2%) for women that significantly different between the sexes was not observed ( $P>0.05$ ) (Table 2).

Infection in people who sometimes used the soap to wash hands was significantly more than those who always used soap ( $P<0.001$ ) (Table 2).

Infection in people with poor economic conditions, was significantly more than the two groups with moderate and good economic conditions ( $P<0.001$ ) (Table 2).

The relationship between intestinal parasites and how to wash vegetables, showed no significant ( $P>0.05$ ) (Table 2).

Despite the frequency of intestinal parasites in different age groups did not differ significantly, in age group 10–19 years, the highest rate of infection was observed ( $P>0.05$ ) (Table 2).

#### 4. Discussion

One of the most common infections in the world is intestinal parasites. About 3.5 billion people are affected

in the world of which 450 million infected people, mostly children, suffer the effect of these contaminants. Infection with this parasite may be associated with symptoms such as intestinal disorders, anemia, malabsorption, growth failure in children and physical psychological problems, therefore, it was seen as the main health problem[12].

In this study, the prevalence of intestinal parasites was reported 16.4% that in comparison with the results of studies conducted in recent decades in other Provinces of Iran, and even in some countries are less[2,5,12–38].

The result of the present study was similar to results of previous studies in Lorestan Province in which the prevalence of intestinal parasites was reported low[39–41].

A number of similar studies results in other countries show that the frequency of intestinal parasites than it in previous decades, has been significantly reduced which proposed reasons for this reduction[16,31,35,38].

In Iran, due to the significant improvement in the level of public health because of modern agricultural development, improved household economy as well as public health sanitation, the incidence of transmission of parasitic diseases and their prevalence is declining than the past[6,28].

A total of 98% of parasites reported in this study were protozoa that were significantly more than helminthes ( $P<0.05$ ). This study is consistent with a number of studies that have reported the frequency of helminthes were more protozoal[38]. Higher rate of intestinal protozoa infections is due to such direct transfer, reproduce simple, simple life cycle, resistance of protozoan cysts and healthy carriers[28]. The most common intestinal parasite in this study was *G. lamblia*, despite its decline in the past, was still at the head of intestinal parasitic infections[39,40]. Almost all children up to age 3 in tropical areas with poor hygiene level were infected once[41].

In this study, the second most common protozoan was *B. hominis*. Although this frequency is lower than results in some studies[42], but similar to the reported prevalence in previous studies conducted in Lorestan Province[43]. Since some researchers believe that this parasite is pathogenic, but in most cases it is not treated, so we should be more hesitant to deal with this parasite[44].

In present study, the prevalence of intestinal parasites in groups with poor economic conditions was significantly more. This result is more consistent with the similar studies which have suggested that the prevalence of the parasite in impoverished areas with high population density is higher[5].

In this study, out of 465 infected samples, 262 (56.4%) samples were infected with nonpathogenic intestinal parasites. Although these parasites have no role in causing

infectious diseases, the observance of them is due to fecal – oral transition which is an indicator for measurement of health status in area.

The results of this study are consistent with the results of the study that showed the prevalence of intestinal parasites in rural areas is more[28].

Effective reasons for the reducing incidence of intestinal parasites in Lorestan Province could be the development of universities with more students led to increased awareness, improvement of the environment, increase of the ease of access to health care centers, increase of advertising in provincial mass media about health training, increased health culture, dispose of sanitary waste properly. These reasons are similar to the obtained results in a number of studies conducted in Iran[16,31,37,38].

According to the results, it is recommended to learn more about the distribution of parasites, and epidemiological studies in other Iranian Provinces that each has its own unique weather conditions should be done. Finally, under the supervision of the Ministry of Health and collaboration with the Medical Universities, the necessary measures to prevent, control and minimize parasitic infections take place.

### Conflict of interest statement

The authors declare that there is no conflict of interests.

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### References

- [1] Mehraj V, Hatcher J, Akhtar S, Rafique G, Beg MA. Prevalence and factors associated with intestinal parasitic infection among children in an urban slum of Karachi. *PLoS One* 2008; **3**: e3680.
- [2] Nematian J, Nematian E, Gholamrezanezhad A, Asgari AA. Prevalence of intestinal parasitic infections and their relation with socio–economic factors and hygienic habits in Tehran primary school students. *Acta Trop* 2004; **92**: 179–186.
- [3] Anvarian M. The prevalence of intestinal protozoa in patients referred to Tabriz Imam Reza Hospital from January 2010 to December 2010. *Adv Environ Biol* 2011; **5**: 1916–1919.
- [4] Dagci H, Kurt O, Demirel M, Ostan I, Azizi NR, Mandiracioglu A, et al. The prevalence of intestinal parasites in the province of Izmir, Turkey. *Parasitol Res* 2008; **103**: 839–845.
- [5] Mengistu A, Gebre–Selassie S, Kassa T. Prevalence of intestinal parasitic infections among urban dwellers in southwest Ethiopia. *Ethiop J Health Dev* 2007; **21**: 12–17.
- [6] Akhlaghi L, Shamsedin J, Meamar AR, Razmjou E, Oormazdi H. Frequency of intestinal parasites in Tehran. *Iran J Parasitol* 2009; **4**: 44–47.
- [7] Romana KV, Rao SD, Rao R, Mohanty SK, Wilson CG. Human dipylidiasis, A case report of *Dipylidium caninum* infection in teaching hospital at Karimnager online. *Online J Health Allied Scs* 2011; **10**: 28.
- [8] Wegayehu T, Tsalla T, Seifu B, Teklu T. Prevalence of intestinal parasitic infections among highland and lowland dweller in Gamo area, south Ethiopia. *BMC Public Health* 2013; **13**: 151.
- [9] Karambaigi F, Abdi J, Sayehmiri K. Prevalence of *Entamoeba histolytica* in Iran during 1988 to 2009: systematic review and meta–analyses. *Afr J Microbiol Res* 2012; **6**: 3944–3947.
- [10] Azizi K, Heidari S. A comparative study on energy balance and economical indices in irrigated and dry land barley production systems. *Int J Environ Sci Technol* 2013; **10**: 1019–1028.
- [11] Statistical Centre of Iran. Iran statistical year book, Lorestan Province statistical year book 2011. Khorram Abada, Iran: Lorestan Governorate; 2011. [Online] Available from: <http://www.amar.org.ir/Default.aspx?tabid=1693> [Accessed on March 3rd, 2014]
- [12] Jamaiah I, Rohela M. Prevalence of intestinal parasites among members of the public in Kuala Lumpur, Malaysia. *Southeast Asian J Trop Med Public Health* 2005; **36**: 68–71.
- [13] Pérez Cordón G, Cordova Paz Soldan O, Vargas Vásquez F, Velasco Soto JR, Sempere Bordes L, Sánchez Moreno M, et al. Prevalence of enteroparasites and genotyping of *Giardia lamblia* in Peruvian children. *Parasitol Res* 2008; **103**: 459–465 .
- [14] Rashid MK, Joshi M, Joshi HS, Fatemi K. Prevalence of intestinal parasites among school going children in Bareilly District. *Natl J Integr Res Med* 2011; **2**: 35–38.
- [15] Maneeboonyang W, Prommongkol S, Wongjindanon N, Treerattanapiboon L, Pasuralertsakul S, Chaimungkun W, et al. Reexamination of parasitic infections in Karen children on the western border of Thailand: two–year follow–up. *J Trop Med Parasitol* 2008; **31**: 77–84.
- [16] Aksoy U, Akisü C, Bayram–Delibaş S, Ozkoç S, Sahin S, Usluca S. Demographic status and prevalence of intestinal parasitic infections in schoolchildren in Izmir, Turkey. *Turk J Pediatr* 2007; **49**: 278–282.

- [17] Diaz E, Mondragon J, Ramirez E, Bernal R. Epidemiology and control of intestinal parasites with nitazoxanide in children in Mexico. *Am J Trop Med Hyg* 2003; **68**: 384–385.
- [18] Shrestha A, Narayan KC, Sharma R. Prevalence of intestinal parasitosis among school children in Baglung districts of Western Nepal. *Kathmandu Uni Med J (KUMJ)* 2012; **10**: 3–6.
- [19] Abu-Madi MA, Behnke JM, Doiphode SH. Changing trends in intestinal parasitic infections among long-term-residents and settled immigrants in Qatar. *Parasit Vectors* 2010; **14**: 98.
- [20] Alyousefi NA, Mahdy MA, Mahmud R, Lim YA. Factors associated with high prevalence of intestinal protozoan infections among patients in Sana'a City, Yemen. *PLoS One* 2011; **6**: e22044.
- [21] Lander RL, Lander AG, Houghton L, Williams SM, Costa-Ribeiro H, Barreto DL, et al. Factors influencing growth and intestinal parasitic infections in preschoolers attending philanthropic daycare centers in Salvador, Northeast Region of Brazil. *Cad Saude Publica* 2012; **28**: 2177–2188.
- [22] Babatunde SK, Salami AK, Fabyi JP, Agbede OO, Desalu OO. Prevalence of intestinal parasitic infestation in HIV seropositive and seronegative patients in Ilorin, Nigeria. *Ann Afr Med* 2010; **9**: 123–128.
- [23] Molavi GH, Masoud J, Moubedi I, Hassanpour GH. Prevalence of intestinal parasites in Esfahan municipal workers. *J School Public Health Res* 2007; **5**: 43–50.
- [24] Vahedi M, Goharhehi S, Sharif M, Daryani A. Prevalence of parasites in patients with gastroenteritis at East of Mazandaran Province, Northern Iran. *Trop Biomed* 2012; **29**: 568–574.
- [25] Taheri F, Namakin K, Zarban A, Sharifzadeh G. Intestinal parasitic infection among school children in South Khorasan Province, Iran. *J Res Health Sci* 2011; **11**: 45–50.
- [26] Berengi F, Sarvghad MR, Fata A, Hosseinejad Z, Saremi E, Ganjbakhsh M, et al. A study of the prevalence of intestinal parasitic infection in HIV positive individuals in Mashhad, Northeast Iran. *Jundishapur J Microbiol* 2010; **3**: 61–65.
- [27] Hazratitappe KH, Mohammadzadeh H, Khashaveh SH, Rezapour B, Barazesh A. Prevalence of intestinal parasitic infections among primary school attending students in Barandooz–Chay rural region of Urmia, West Azerbaijan Province, Iran in 2008. *Afr J Microbiol Res* 2011; **5**: 788–791.
- [28] Mowlavi GR, Mirahmadi H, Mostafa R, Kia EB, Ebrahimi Daryani N, Rokni MB, et al. Prevalence of intestinal parasites in tribal parts of Khuzestan Province during 2005–07. *Govaresh J* 2008; **12**: 219–228.
- [29] Ebadi M, Anvary MH, Rajabioun A, Dehghani AA. Parasitic infections (helminth and protozoa) in cases referring to Yazd Central Laboratory, 2002–2004. *J Shahid Sadoughi Univ Med Sci* 2008; **15**: 53–58.
- [30] Daryani A, Sharif M, Nasrolahei M, Khalilian A, Mohammadi A, Barzegar G. Epidemiological survey of the prevalence of intestinal parasites among school children in Sari, northern Iran. *Trans R Soc Trop Med Hyg* 2012; **106**: 455–459.
- [31] Nasiri V, Esmailnia K, Karimi G, Nasiri M, Akhavan O. Intestinal parasitic infections among inhabitants of Karaj city, Tehran Province, Iran in 2006–2008. *Korean J Parasitol* 2009; **47**: 265–268.
- [32] Heidari A, Rokni MB. Prevalence of intestinal parasites among children in day-care centers in Damghan–Iran. *Iran J Public Health* 2003; **32**: 31–34.
- [33] Neghab M, Mosavi S, Moemenbellah–Fard MD. Prevalence of intestinal parasitic infections among catering staff of students' canteens at Shiraz, Southern Iran. *Pak J Biol Sci* 2006; **9**: 2699–2703.
- [34] Kuzehkanani AB, Rezaei S, Babaei Z, Niyati M, Hashemi S, Rezaeian M. Enteric protozoan parasites in rural areas of bandar-abbas, southern Iran: comparison of past and present situation. *Iran J Public Health* 2011; **40**: 80–85.
- [35] Haghghi A, Khorashad AS, Nazemalhosseini Mojarad E, Kazemi B, Rostami Nejad M, Rasti S. Frequency of enteric protozoan parasites among patients with gastrointestinal complaints in medical centers of Zahedan, Iran. *Trans R Soc Trop Med Hyg* 2009; **103**: 452–454.
- [36] Sayyari AA, Imanzadeh F, Bagheri Yazdi SA, Karami H, Yaghoobi M. Prevalence of intestinal parasitic infections in the Islamic Republic of Iran. *East Mediterr Health J* 2005; **11**: 377–383.
- [37] Rokni MB. The present status of human helminthic diseases in Iran. *Ann Trop Med Parasitol* 2008; **102**: 283–295.
- [38] Chang AH, Perry S, Du JN, Agunbiade A, Polesky A, Parsonnet J. Decreasing Intestinal parasites in recent northern California refugees. *Am J Trop Med Hyg* 2013; **88**: 191–197.
- [39] Kheirandish F, Tarahi MJ, Haghghi A, Nazemalhosseini– Mojarad E, Kheirandish M. Prevalence of intestinal parasites in bakery workers in Khorramabad, Lorestan Iran. *Iran J Parasitol* 2011; **6**: 76–83.
- [40] Kheirandish F, Tarahi MJ, Ezatpour B. Prevalence of intestinal parasites among food handlers in West of Iran. *Rev Inst Med Trop Sao Paulo* 2014; **56**: 111–114.
- [41] Badparva E, Fallahi SH, Birjandi M, Pournia Y, Kayedi MH. Prevalence of intestinal parasites in the rural regions of Kouhdasht, Lorestan Province, Iran, 2008. *Asian J Biol Sci* 2009; **2**: 105–111.
- [42] Davari A, Akhlaghi L, Memar AR, Namazi MJ, Tabatabaee F, Tarihi S, et al. Frequency of intestinal parasites on mental disabilities in rehabilitation centers in Ardabil city at 2011. *Q J Sabzevar Uni Med Sci* 2013; **20**: 101–108.
- [43] Badparva E, Sadraee J, Kheirandish F, Frouzandeh M. Genetic diversity of human *Blastocystis* isolates in Khorramabad, central Iran. *Iran J Parasitol* 2014; **9**: 44–49.
- [44] Tan KS. New insights on classification, identification, and clinical relevance of *Blastocystis* spp. *Clin Microbiol Rev* 2008; **21**: 639–665.