Final Report of the Project

"Baseline Prevalence Survey

of Schistosomiasis

in Maguindanao, 2008"

Submitted by:

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Prevalence Survey of Schistosomiasis in Maguindanao

The prevalence survey of schistosomiasis in Maguindanao was undertaken to complete the survey of schistosomiasis in Mindanao, the first phase of the "National Prevalence Survey of Schistosomiasis in the Philippines" which was concluded without the participation of the province in 2005. This was followed by the second phase in the Visayas completed in 2006. The third phase in the island of Luzon was concluded in the latter part of 2007.

The results of all three phases have been submitted in three terminal reports to WHO and presented in three international conferences namely the International Symposium on Schistosomiasis held in the Philippines in 2006, the Regional Network on Asian Schistosomiasis and Other Helminth Zoonoses held in China on September 7, 2007 and the International Congress on Tropical Medicine and Malaria held in Jeju, Korea on September 30 to October 3, 2008. The results of the first two phases were published in a paper entitled "Prevalence Survey of Schistosomiasis in Mindanao and the Visayas, the Philippines" in Parasitology International, 2008 Vol. 57 pp. 246-251.

The need to include Maguindanao in the investigation cannot be over-emphasized given that the objective of the national survey is to stratify schistosomiasis endemic provinces into high prevalence, moderate prevalence and low prevalence areas. Past data show that Maguindanao is included among the high prevalence areas, hence this separate study to obtain the most recent information about the status of the disease.

Results of all three phases of the national survey show that a sampling method used called stratified two-step systematic cluster sampling design has been effective for a disease that is non-random and focal in distribution like schistosomiasis. The decision to use this design was reached following several meetings among stakeholders that included Dr. Raman Velayudhan from the World Health Organization, Dr. Mario Baquilod, Dr. Leda Hernandez, Mr. Ernesto Erce and Ms. Ruth Martinez of the National Center for Disease Prevention and Control, Dr. Vito Roque and Mr. Herdie Hizon from the National Epidemiology Center, Dr. Gemiliano Aligui who was then the executive director of the Philippine Council for Health Research and Development and Dr. Pilarita Rivera, Dr. Ofelia Saniel and Dr. Lydia Leonardo from the College of Public Health of the University of the Philippines Manila.

In all three phases of the national survey, manuals were used detailing the sampling areas, the sample size, the sampling design, the Kato-Katz stool examination and the subsequent quality assurance that will be made by qualified validators. Meetings were held with the regional coordinators, provincial health team leaders and other personnel who took charge of the survey proper.

The Maguindanao survey started in April 2008 and was completed at the end of August 2008. It followed the same protocol used in all the provinces covered by the survey. A team composed of Dr. Lydia Leonardo and Ms. Ellen Villacorte from the College of Public Health, Mr. Edgardo Erce from the Department of Health and Ms.

Imelda Pates, the project assistant made an initial visit to the study site on July 9, 2008. Coordinations were set up with the DOH Regional Secretary in the Autonomous Region of Muslim Mindanao (ARMM) Dr. Tahir B. Sulaik. The following areas which were initially recommended for the survey were changed after consultation with Dr. Sulaik. Reasons given were inaccessibility of the barangays, the unstable peace and order situation as well as the absence of cases of schistosomiasis in these barangays in past surveys.

Municipalities to Be Sampled	Barangays to Be Sampled
1. Buldon	Edcor (Gallego Edcor)
2. Datu Odin Sinsual (Dinaig)	Awang
3. Parang	Gumagadong Calawag
4. Sultan sa Barongis (Lambayong)	Bulod
5. South Upi	Romangaob

In place of the above, the following were subsequently included in the survey.

Municipalities	Barangays Sampled
Datu Abdullah Sangki	Banaba
Datu Paglas	Sepaca
Guindulungan	Bagan
Datu Unsay	Maitumaig
Datu Anggal Midtimbang	Brar

As in the Mindanao survey, the households were selected in a systematic manner. A masterlist of all the households in the barangay was used as reference in the selection of the households. A total of 274 subjects were required for each barangay included in the sample. Two stool samples were required from each eligible member (referring to those whose age is two years and above) in the selected households.

Close coordination was maintained with the DOH Secretary of ARMM, the provincial health office, municipal health office and the local executive officials for the duration of the survey.

Results

A total of 1,370 respondents were required from this survey. Figure 1 shows the response rates of the five municipalities that ranged from a low of 33.2% in Datu Anggal Midtimbang to a high of 66.0% in Datu Paglas. The overall response rate was 45.2%.

Four out of the five municipalities were found positive for schistosomiasis. Datu Unsay ranked first with a prevalence of 7.1% with Guindulungan and Datu Anggal Midtimbang trailing behind with prevalence at 2.0% and 1.1% respectively. Datu Abdullah Sangki showed the lowest prevalence at 0.7%. On the average, the province gave a prevalence of 1.8%. Figure 2 illustrates the prevalence of schistosomiasis in Maguindanao.

Prevalence of the disease was highest among the 50-54 age group at 10.0%. The 10-14 age group had a prevalence of 2.2% (Figure 3). For sex distribution, males exhibited higher prevalence than females (Figure 4). Schistosomiasis cases were either low or moderate intensity infections with the former being twice as more as the latter (Figure 5).

For ascariasis, the figures were higher compared with schistosomiasis. Prevalence was highest in Datu Paglas at 42.0% followed far behind by Datu Anggal Midtimbang at 11.0%, then close behind by Datu Abdullah Sangki at 10.9%. Guindolongan and Datu Unsay showed prevalence rates lower than 10% at 8.8% and 4.0% respectively. This profile is seen in Figure 6. The average prevalence was recorded at 18.4%.

For age distribution, there was a noticeably downward trend with age although a peak in the 65-69 age group was noted (Figure 7). Males had a slightly higher prevalence than females (Figure 8). Figure 9 shows that majority of the cases were low intensity infections. There were no heavy infections.

For trichuriasis, the difference in prevalence among the municipalities was not that great unlike that observed in ascariasis. As seen in Figure 10, Datu Anggal Midtimbang ranked first with prevalence of 28.6% followed not too far behind by Datu Abdullah Sangki at 19.9% and Datu Paglas at 19.3%, then Guindolongan at 16.6%. Last in the list was Datu Unsay with prevalence of 6.1%. The average prevalence rate for trichuriasis was 18.3% an almost imperceptible difference from ascariasis.

Figure 11 shows that the prevalence of trichuriasis was higher among the younger age groups from 2 y.o. to 19 y.o. abruptly dropping only to rise again gradually among the 30-34 y.o. to 40-44 y.o. There was another peak among the 50-54 y.o. For sex distribution, the pattern was very similar to ascariasis with the slightly higher rate among the males (Figure 12). Figure 13 shows that almost all of the cases of trichuriasis were low intensity infections. A miniscule proportion of moderate infections was recorded but no heavy infections were detected.

There were only two cases of hookworm infection, both light intensity, found during the survey one in Datu Abdullah Sangki and the other in Guindulungan (Figure 14). Both cases were males one belonging to the 55-59 age group and other one with unrecorded age (Figure 15).

Heterophyidiasis was recorded only in three municipalities namely Datu Abdullah Sangki with prevalence of 1.9, Datu Unsay with prevalence of 1.0% and Guindulungan at 1.0% (Figure 16). The overall prevalence was placed at 0.8%. The cases of heterophyidiasis were distributed among the 6-9 y.o., 30-34 y.o., 40-44 y.o.and 45-49 y.o.(Figure 17). There were more female cases than males (Figure 18). Only light infections were detected.

There was only one case of paragonimiasis found in Datu Paglas, male and with unrecorded age.

Discussion

Maguindanao and Marawi City are the two places in ARMM that were included in the Mindanao survey or Phase 1 of the National Prevalence Survey of Schistosomiasis Project. Maguindanao was chosen since it has consistently been considered as a highly endemic province for schistosomiasis. In 1997, it was ranked first in the list of schistosomiasis endemic provinces in the Philippines with a prevalence rate of 18.9%. It was grouped with Agusan del Sur and Lanao del Norte as the high prevalence provinces. In 2005, it continued to maintain its status as a high prevalence province with a prevalence rate of >10% together with Agusan del Sur, Butuan City and the new endemic province of Negros Occidental.

In the present survey, the prevalence rate recorded for Maguindanao after averaging the prevalence rates from the 5 municipalities covered in this survey was 1.8%. Although it took three years to finally complete the survey in Mindanao with the addition of the Maguindanao data, it would be interesting to see how the trend changes for the regions in Mindanao with the inclusion of the Maguindanao results. For example, in the 2005 survey, Caraga ranked first in prevalence of schistosomiasis followed closely by Region 11 and Region 10 but with the inclusion of the Maguindanao results, while Caraga maintained its first position, the second place now went to ARMM with even a large edge over Regions 11 and 10 (See Appendix B Figures A-1 and A-2).

In terms of ranking by province, Maguindanao ranks second after Agusan del Sur bumping off Bukidnon from second place (Figures B-1 and B-2). Table 1 below shows the ranking of the other endemic provinces of Mindanao. The Maguindanao results did not change the sex distribution and the age distribution of the disease.

Table 1: Ranking of Provinces According to Prevalence of Schistosomiasis (in percent)

Rank	Province	Prevalence	Region
1	Agusan del Sur	4.0	Caraga
2	Maguindanao	1.8	ARMM
3	Bukidnon	1.7	10
4	Surigao del Sur	1.3	Caraga
5	Lanao del Norte	0.8	10
6	Davao del Norte	0.8	11
7	Compostela Valley	0.7	11
8	Cotabato + Kidapawan	0.5	12
9	Marawi City	0.4	ARMM
10	Surigao del Norte	0.3	Caraga
11	South Cotabato	0.3	12
12	Sultan Kudarat	0.2	12
13	Davao del Sur + Digos	0.1	11

14	Agusan del Norte	0.1	Caraga

While the survey results yield much lower figures, the ranking of the provinces remains. Maguindanao still occupies the higher position in the list of schistosomiasis endemic provinces in the Philippines.

In the case of ascariasis, Figure C-1 shows that in the 2005 survey, ARMM ranked first in prevalence of ascariasis, followed by Region 10 and Region 9, third. The inclusion of the Maguindanao results (Figure C-2) brought down the prevalence of ascariasis bringing down ARMM to the third position below Region 10 which was pushed to the first position and Region 9 on the second. As seen in Figures D-1and D-2, the inclusion of the Maguindanao data does not change the ranking of the top ten provinces.

For trichuriasis, as seen in Figures E-1 and E-2, the inclusion of the Maguindanao data did not change the ranking of the regions. As seen in Figures F-1 and F-2, Maguindanao bumped off Marawi City from the 10th place. Figures G-1 and G-2 show that the inclusion of the Maguindanao data for hookworm prevalence did not change the ranking of the regions. ARMM remained last in the list as far as prevalence of hook worm infection is concerned. Figures H-1 and H-2 also show that the Maguindanao data did not change the ranking of the provinces based on hookworm prevalence. Maguindanao was added to the tail end of the list.

Figures I-1 and I-2 show the change in the ranking of ARMM when the data on prevalence of heterophyidiasis in the province was added. From last in the list, the region advanced to fourth place. Figures J-1 and J-2 show the inclusion of Maguindanao among the top ten provinces for heterophyidiasis.

It is interesting to observe how the inclusion of the Maguindanao data changed the ranking of the regions and the provinces. For schistosomiasis and heterophyidiasis, the additional data moved ARMM higher in the list while for STH, the data resulted in a lowered rank or status quo.

It might be difficult to predict the effect of the three-year difference in the data collection for Phase I (Mindanao survey) and the Maguindanao survey. It could be argued that the present data could be the result of intervention programs implemented within the last three years and, therefore, should not be compared with data from three years ago from the rest of Mindanao.

It could be possible that had Maguindanao been included in the Phase 1 survey, it would have been top-ranked in terms of prevalence of schistosomiasis and the other fecal-borne parasitic infections detected in the stool survey. This proposal stems from the previous record of Maguindanao as one of the high prevalence provinces for schistosomiasis and possibly STH. It could be said that whatever change the three-year difference in data collection could have caused must not have been enough to altogether turn around the status of Maguindanao as a high prevalence province for schistosomiasis.

On the other hand, the intensive twice a year deworming must have brought down the prevalence of STH in the province.

Conclusion:

The Maguindanao survey was finally completed after a three-year delay. While it may not be appropriate to compare the results with those of the Phase I survey, it is interesting how the inclusion of the Maguindanao data changed the ranking of the regions and provinces based on the prevalence of schistosomiasis and other fecal-borne parasitic infections detected in the stool survey such as STH and heterophyidiasis. If for the purpose of determining the status of Maguindanao as regards parasitic infections, the survey was able to show the prevalence of schistosomiasis, STH, heterophyidiasis, paragonimiasis and taeniasis in the province.

Recommendations

The survey faced problems in coordination and timing. For some reasons, the survey could not start even when the available resources including the manpower were already in place. And when it finally took off, it had to be fast tracked so as not to be overtaken by the elections in the region and worse the armed conflict that eventually occurred.

In projects like this, the cooperation and commitment of the local DOH personnel should be assured to avoid compromising the results. In conflict-stricken provinces like Maguindanao, time is of the essence in carrying out any project. The urgency of working while there is peace should be topmost in the minds of those conducting and coordinating the project.

With regards to the results of the survey, the fact that the three-year delay did not make a difference in the ranking of Maguindanao speaks a lot of how control efforts should further be intensified to improve the situation in the province. In the absence of a well-designed snail control program and other components such as environmental sanitation, chemotherapy becomes an inevitable cornerstone of the intervention program for fecal-borne parasitic diseases such as those detected in this survey. It is therefore recommended that chemotherapy whether mass or selected be sustained as best as possible. And should resources become available, other components like environmental sanitation, health education, snail control and environmental modification should be added in the program.

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Recommendations

The survey faced problems in coordination and timing. For some reasons, the survey could not start even when the available resources including the manpower were already in place. And when it finally took off, it had to be fast tracked so as not to be overtaken by the elections in the region and worse the armed conflict that eventually occurred.

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Figures for the Maguindanao Survey

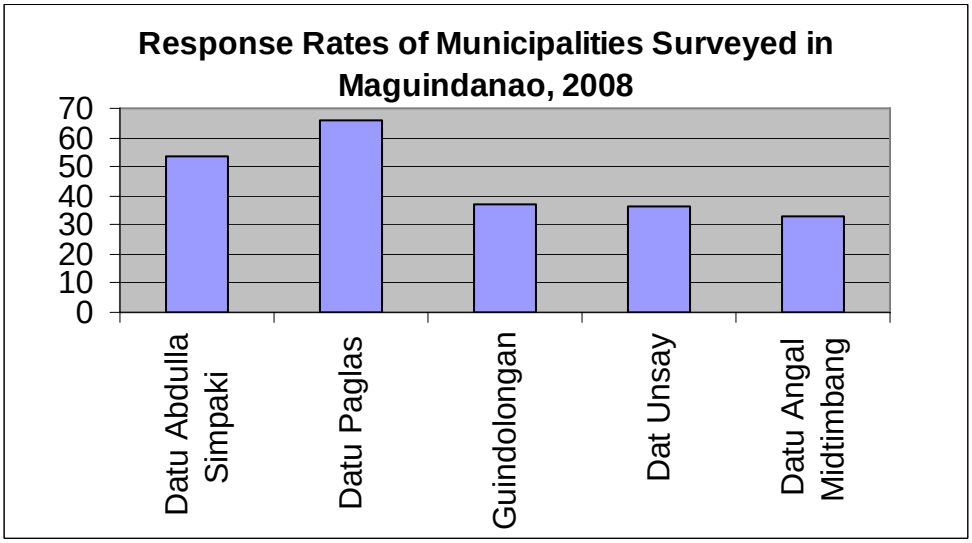


Figure 1

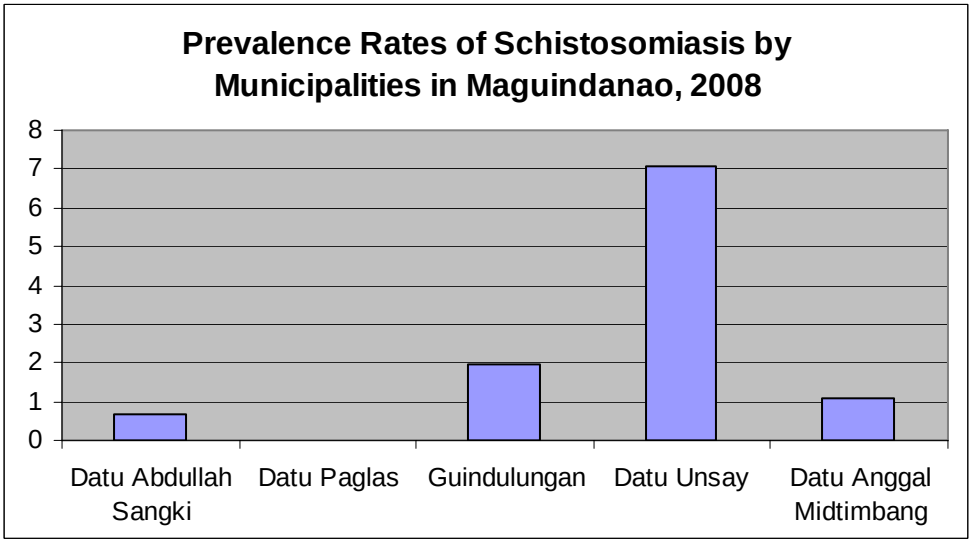


Figure 2

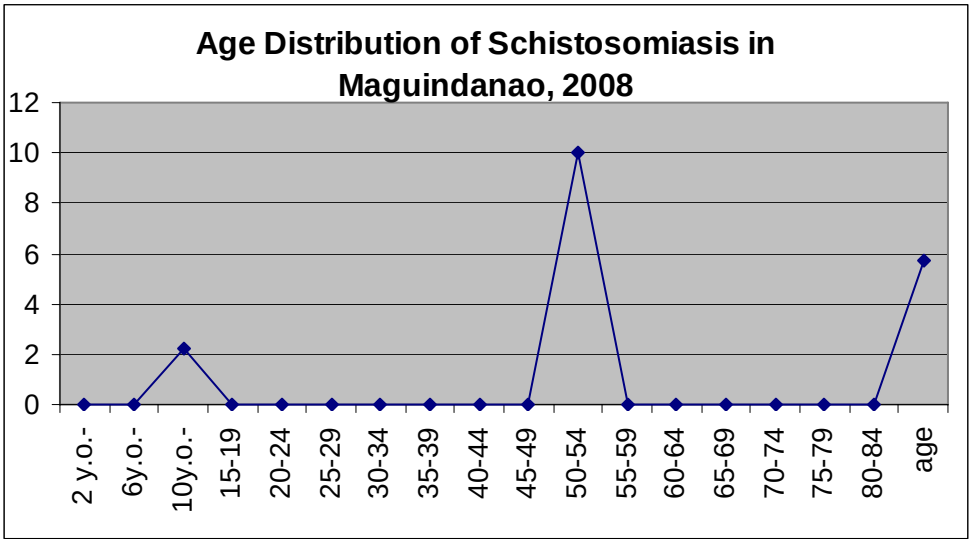
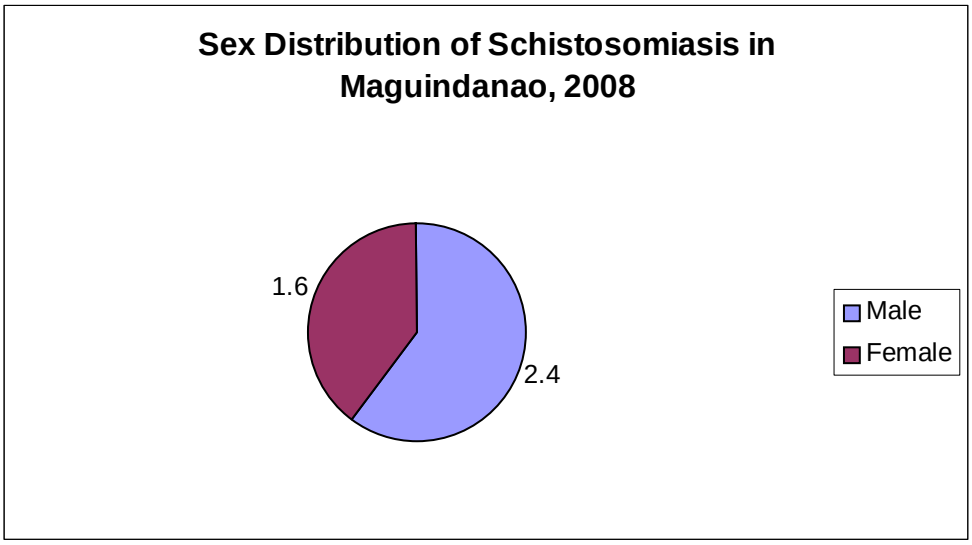


Figure 3



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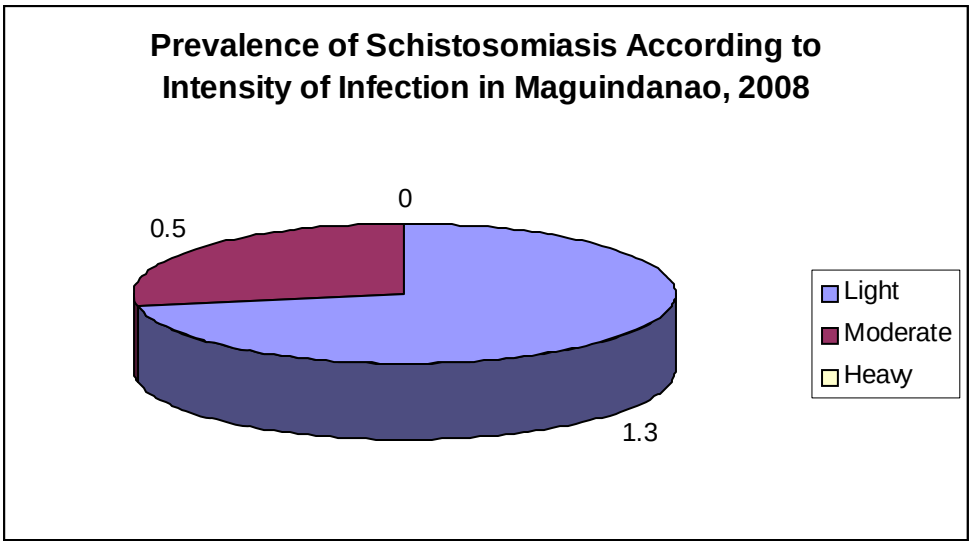

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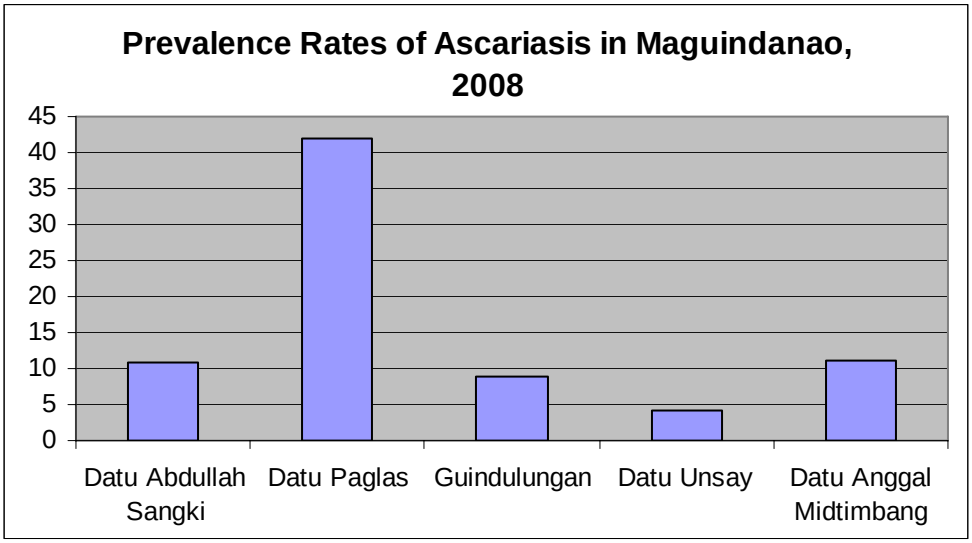

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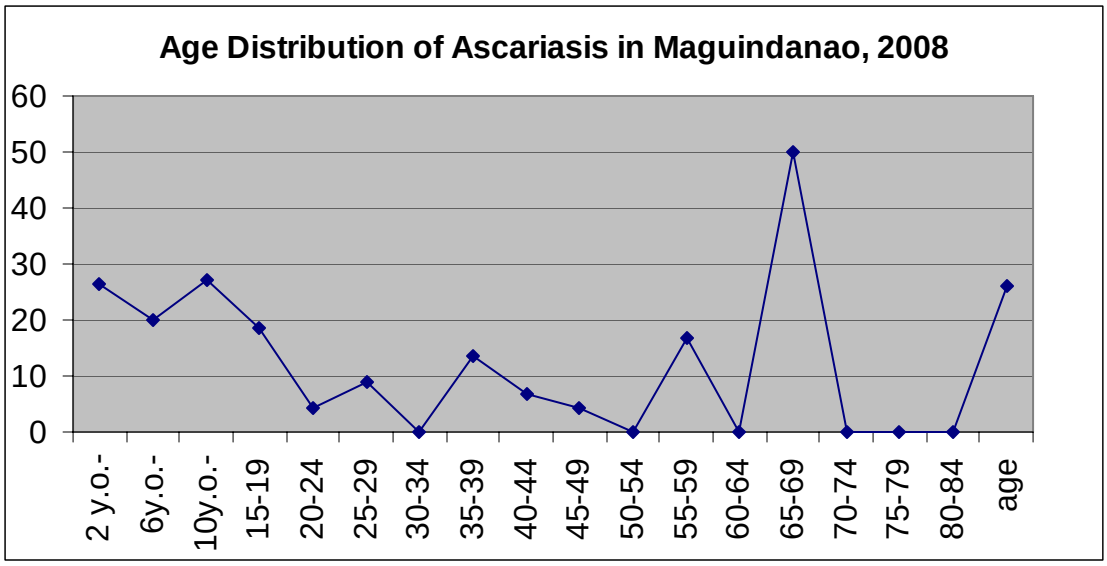

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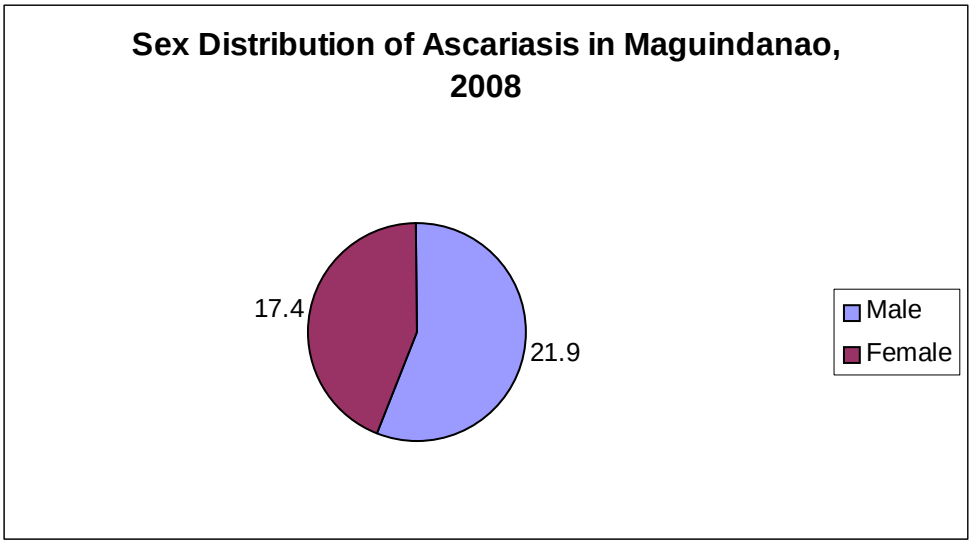


Figure 8

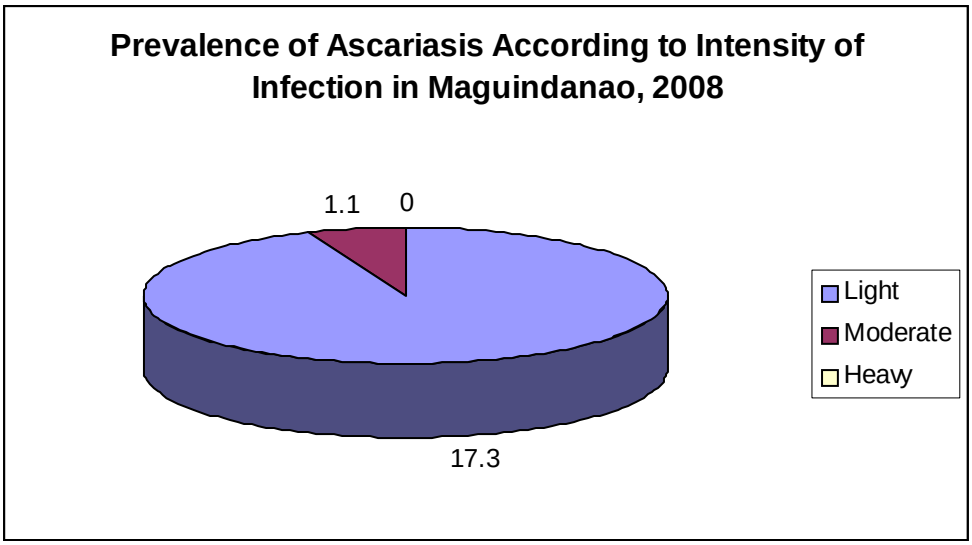


Figure 9

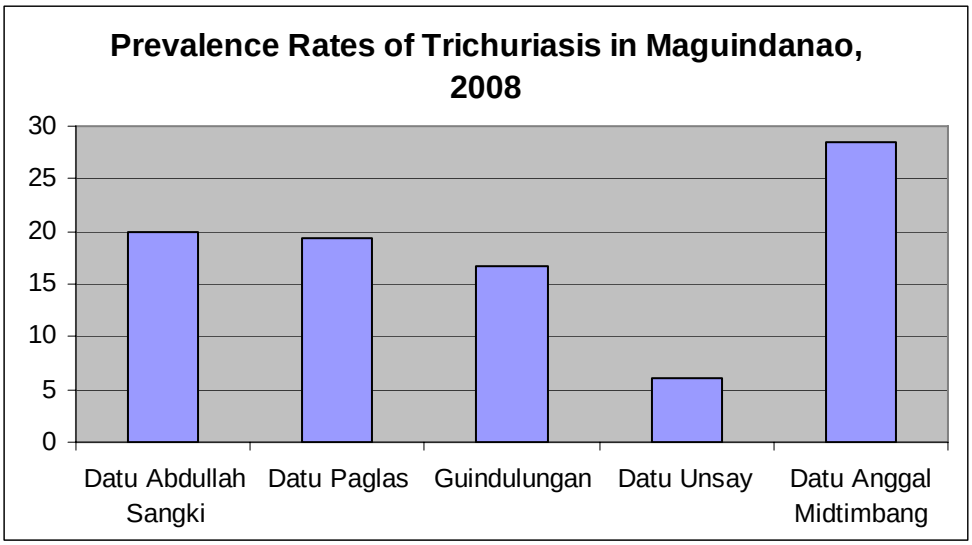


Figure 10

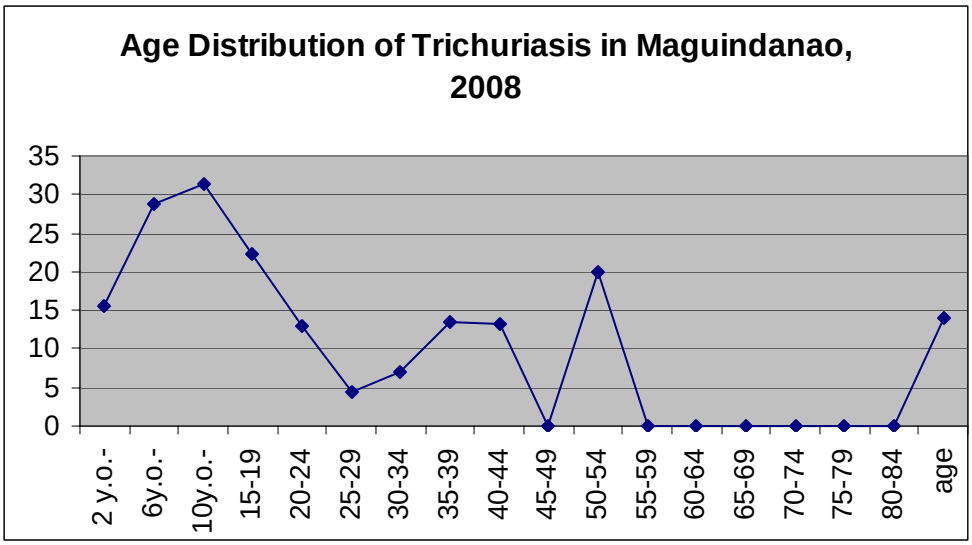
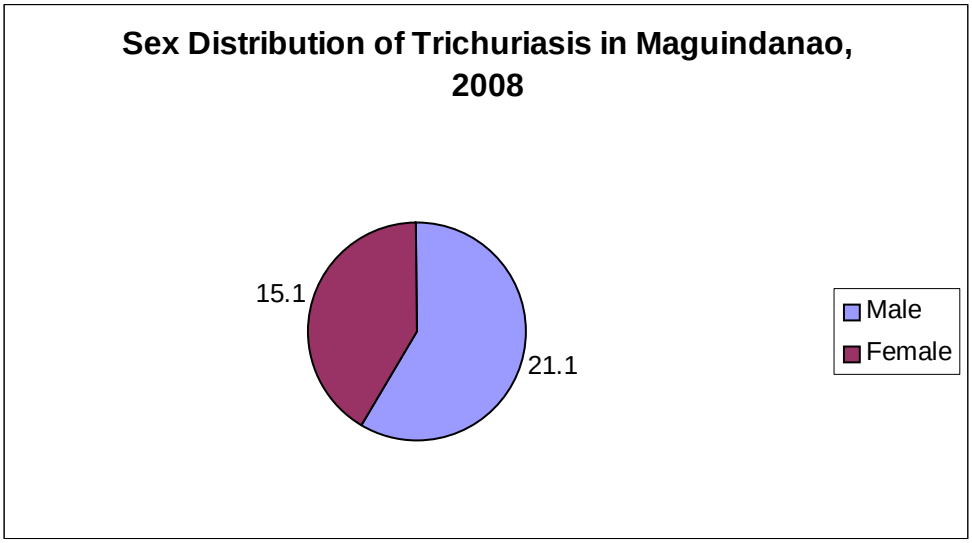


Figure 11



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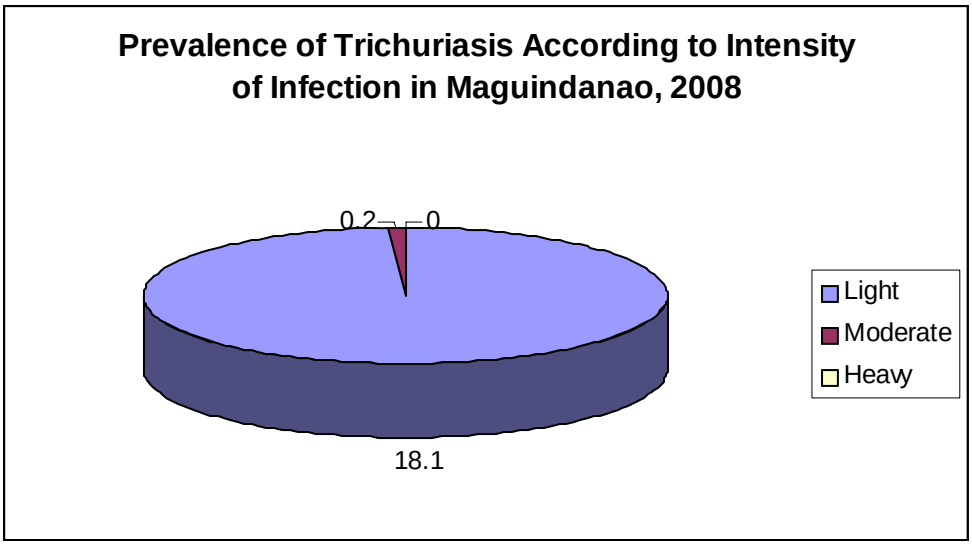

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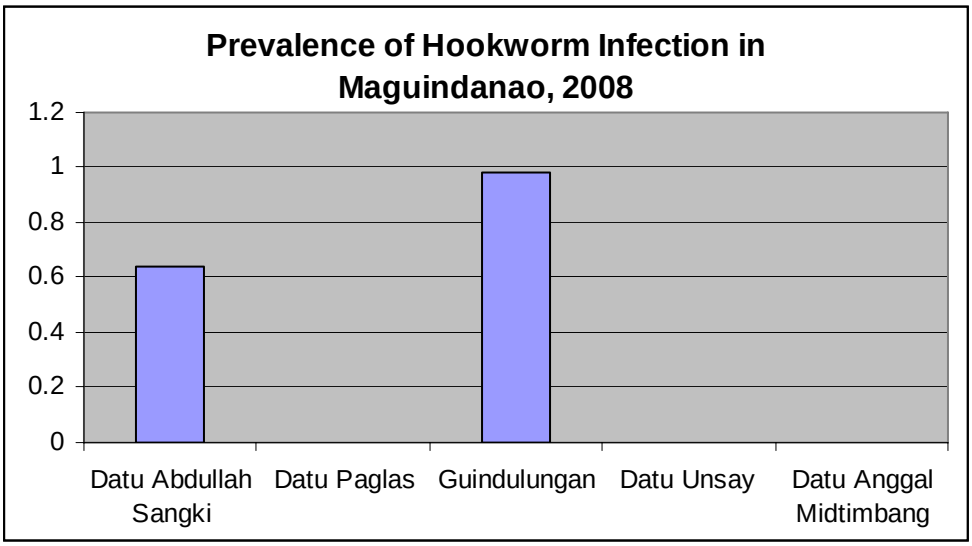

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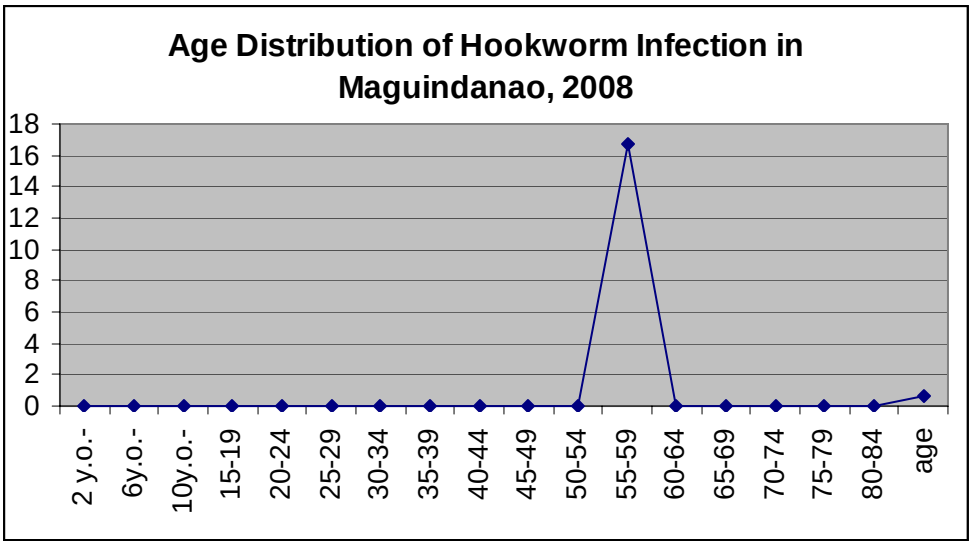

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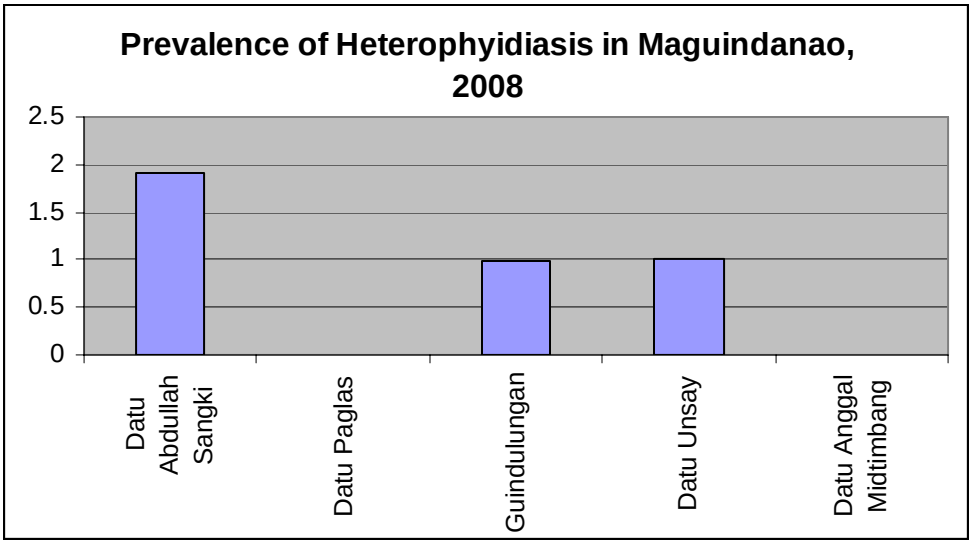

Figure 16

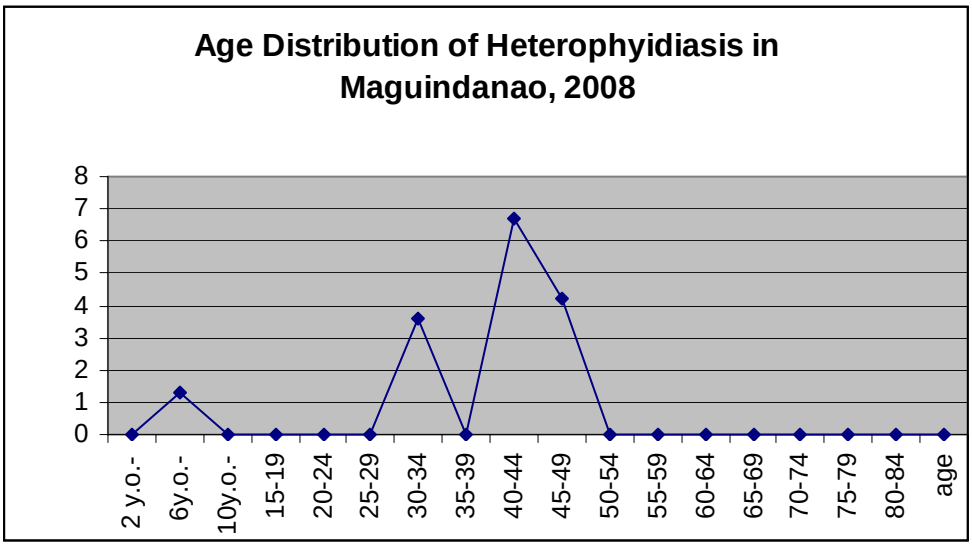

Figure 17

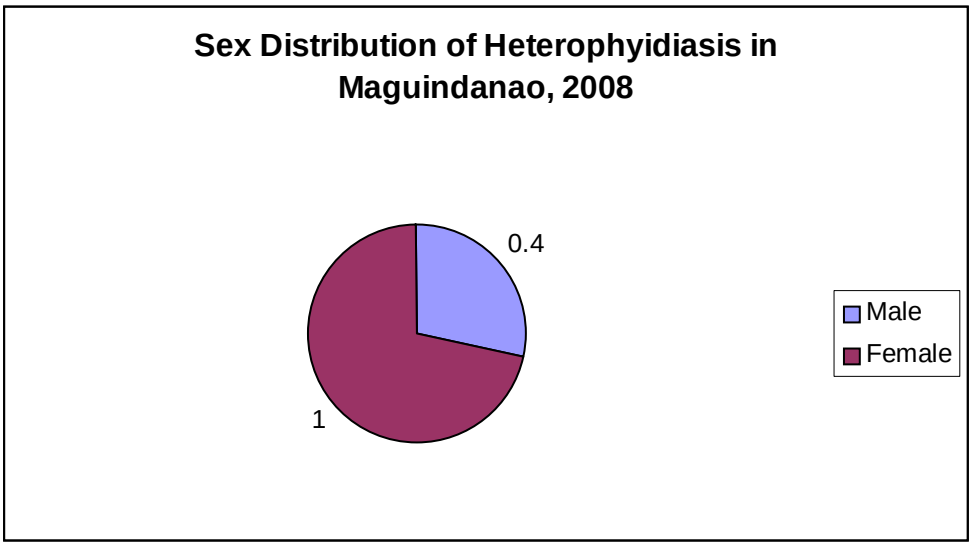

Figure 18

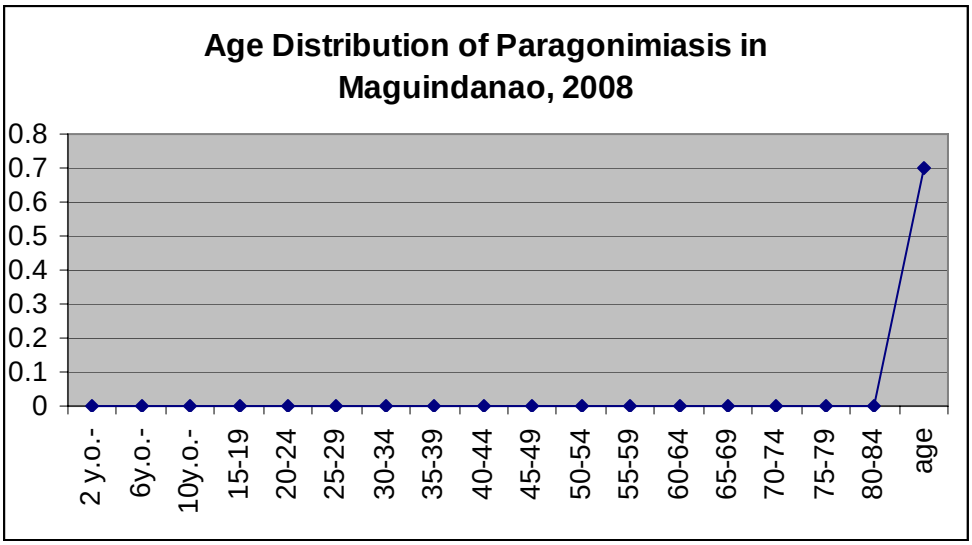
Age Distribution of Paragonimiasis in Maguindanao, 2008
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
2 y.o.-
6y.o.-
10y.o.-
15-19
20-24
25-29
30-34
35-39
40-44
45-49
50-54
55-59
60-64
65-69
70-74
75-79
80-84
age

Figure 19

Ranking of Regions and Provinces in 2005 and 2008

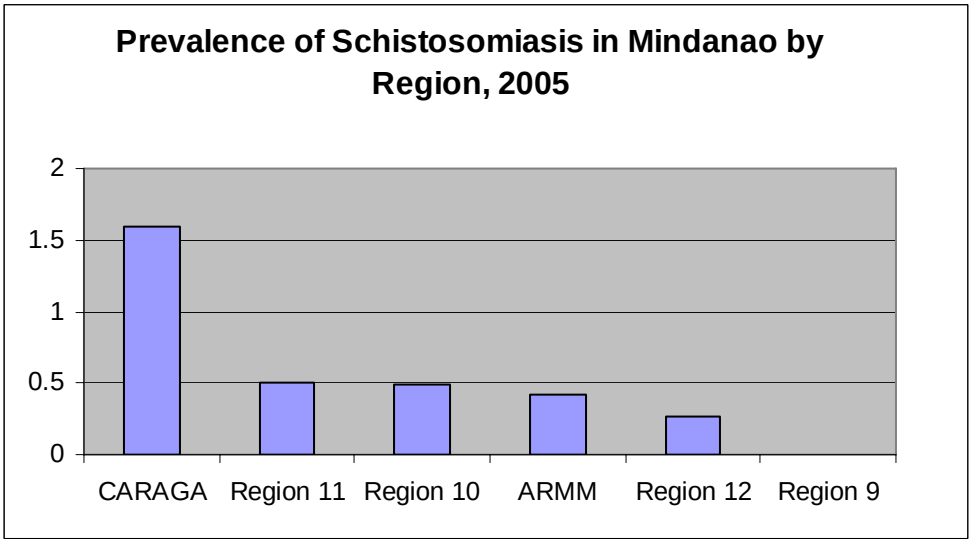

Figure A-1

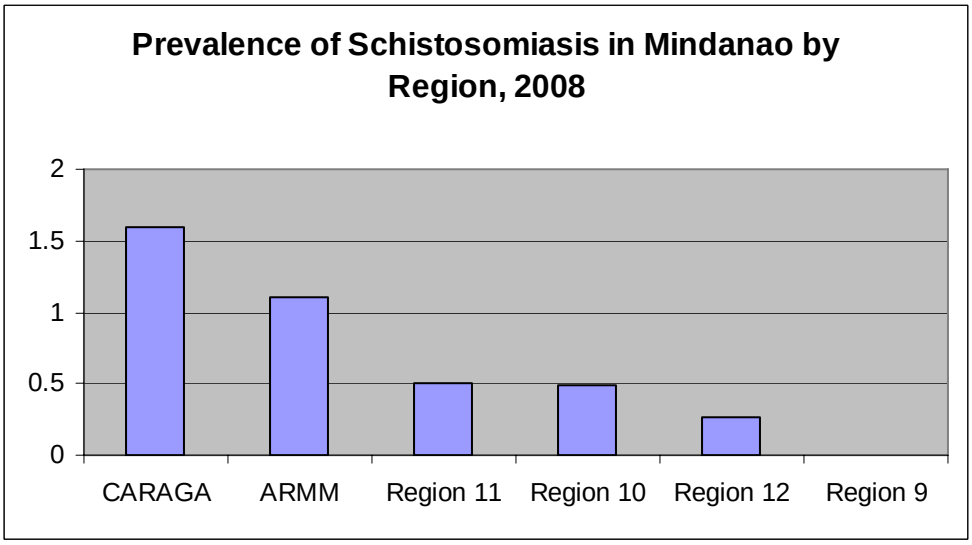

Figure A-2

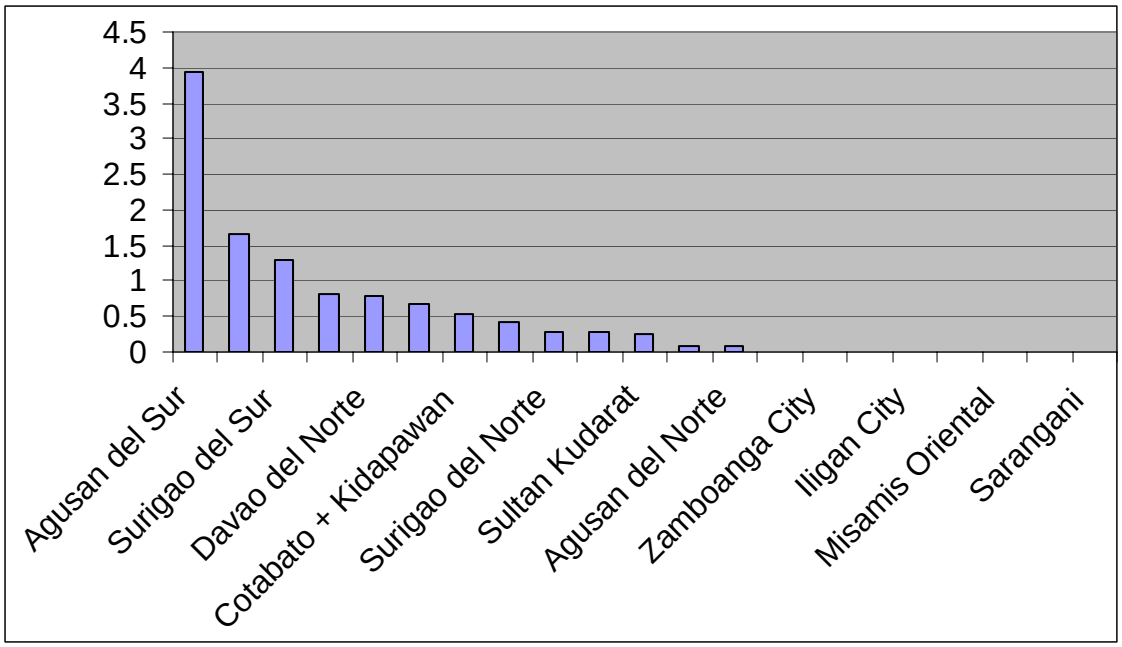

Figure B-1 Prevalence of Schistosomiasis in Mindanao by Province, 2005

Province	Prevalence (%)
Agusan del Sur	3.95
Bukidnon	1.66
Surigao del Sur	1.3
Lanao del Norte	0.81
Davao del Norte	0.78
Compostela Valley	0.68
Cotabato + Kidapawan	0.54
Marawi City	0.42
Surigao del Norte	0.29
South Cotabato	0.28
Sultan Kudarat	0.24
Davao del Sur + Digos	0.09
Agusan del Norte	0.08
Zamboanga Sibugay	0
Zamboanga City	0
Camiguin	0
Iligan City	0
Misamis Occidental	0
Misamis Oriental	0
General Santos City	0
Sarangani	0

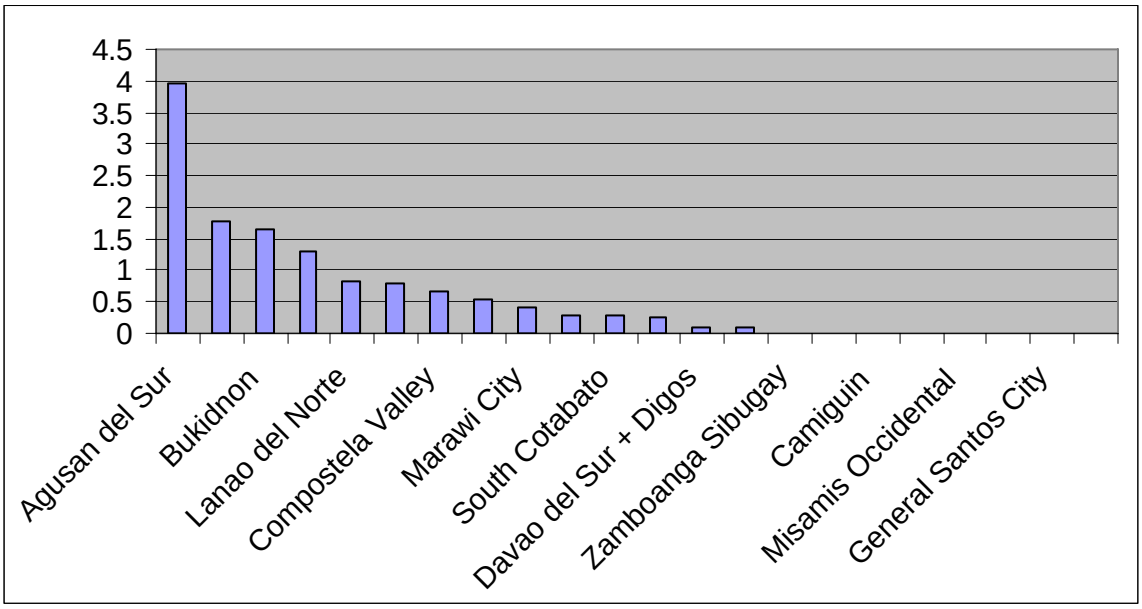

Figure B-2 Prevalence of Schistosomiasis in Mindanao by Province, 2008

Province	Prevalence (%)
Agusan del Sur	3.95
Maguindanao	**1.78**
Bukidnon	1.66
Surigao del Sur	1.3
Lanao del Norte	0.81
Davao del Norte	0.78
Compostela Valley	0.68
Cotabato + Kidapawan	0.54
Marawi City	0.42
Surigao del Norte	0.29
South Cotabato	0.28
Sultan Kudarat	0.24
Davao del Sur + Digos	0.09
Agusan del Norte	0.08
Zamboanga Sibugay	0
Zamboanga City	0
Camiguin	0
Iligan City	0
Misamis Occidental	0
Misamis Oriental	0
General Santos City	0
Sarangani	0

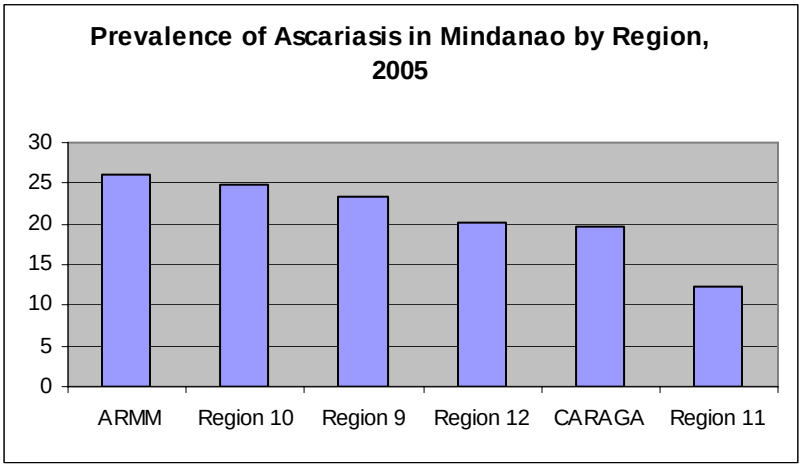

Figure C-1

Region	Prevalence (%)
ARMM	26
Region 10	24.9
Region 9	23.4
Region 12	20.2
CARAGA	19.7
Region 11	12.3

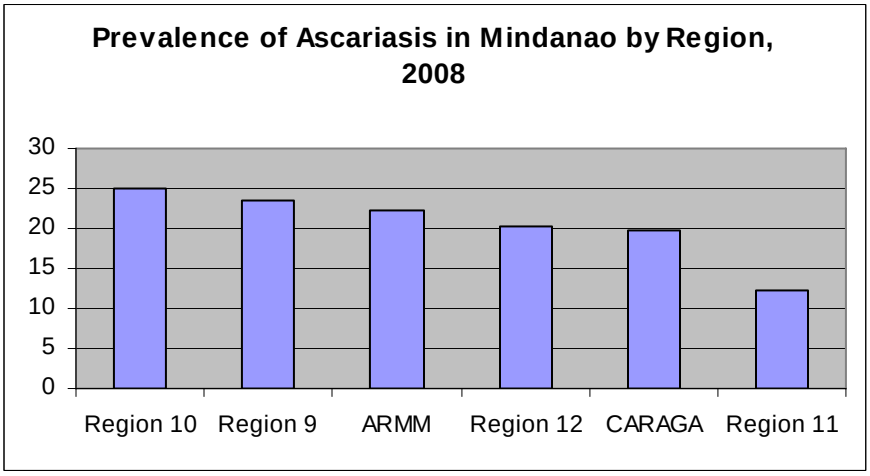

Figure C-2

Region	Prevalence (%)
Region 10	24.9
Region 9	23.4
ARMM	22.22

Region 12	20.2
CARAGA	19.7
Region 11	12.3

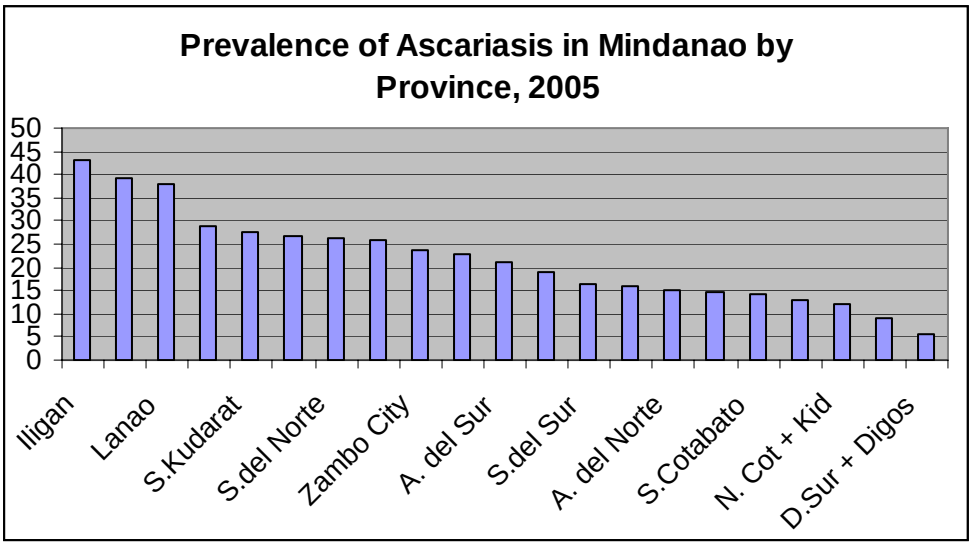

Figure D-1

Province	Prevalence (%)
Iligan	43.1
Mis. Or	39.1
Lanao	37.8
Gen San City	28.8
S.Kudarat	27.6
Sarangani	26.7
S.del Norte	26.1
Marawi City	26
Zambo City	23.9
ZamboSibgay	22.9
A. del Sur	21.1
COMVAL	19.1
S.del Sur	16.3
Mis. Occ	16.1
A. del Norte	15.3
Camiguin	14.7
S.Cotabato	14.3
DvoNorte	12.8
N. Cot + Kid	12
Bukidnon	9.1
D.Sur + Digos	5.7

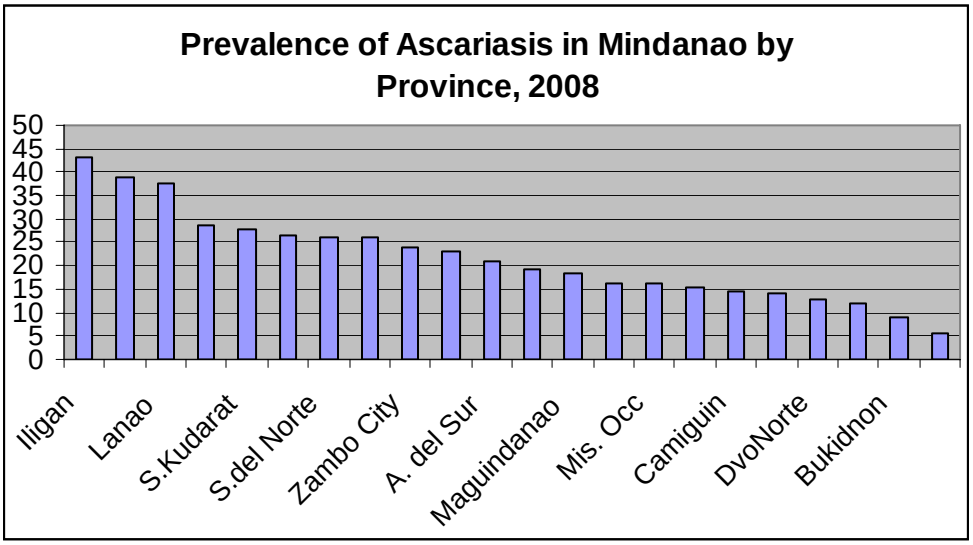

Figure D-2

Province	Prevalence (%)
Iligan	43.1
Mis. Or	39.1
Lanao	37.8
Gen San City	28.8
S.Kudarat	27.6
Sarangani	26.7
S.del Norte	26.1
Marawi City	26
Zambo City	23.9
ZamboSibgay	22.9
A. del Sur	21.1
COMVAL	19.1
Maguindanao	**18.44**
S.del Sur	16.3
Mis. Occ	16.1
A. del Norte	15.3
Camiguin	14.7
S.Cotabato	14.3
DvoNorte	12.8
N. Cot + Kid	12
Bukidnon	9.1
D.Sur + Digos	5.7

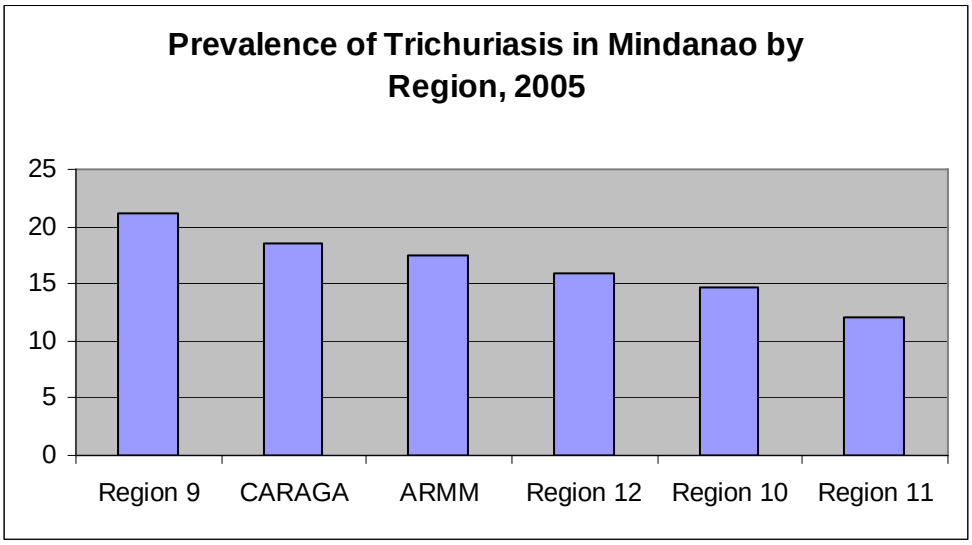

Figure E-1

Region	Prevalence (%)
Region 9	21.2
CARAGA	18.6
ARMM	17.5
Region 12	15.9
Region 10	14.6
Region 11	12.1

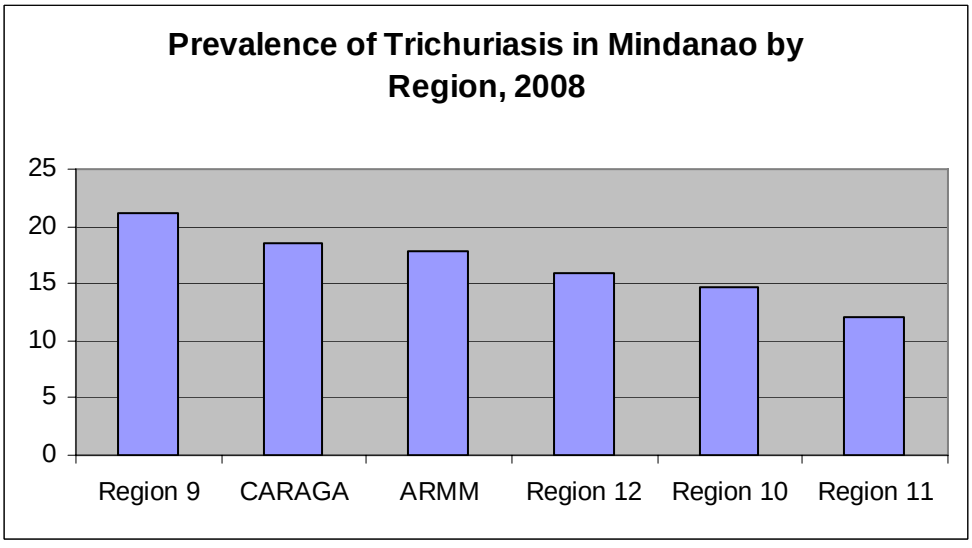

Figure E-2

Region	Prevalence (%)
Region 9	21.2
CARAGA	18.6
ARMM	17.9
Region 12	15.9
Region 10	14.6
Region 11	12.1

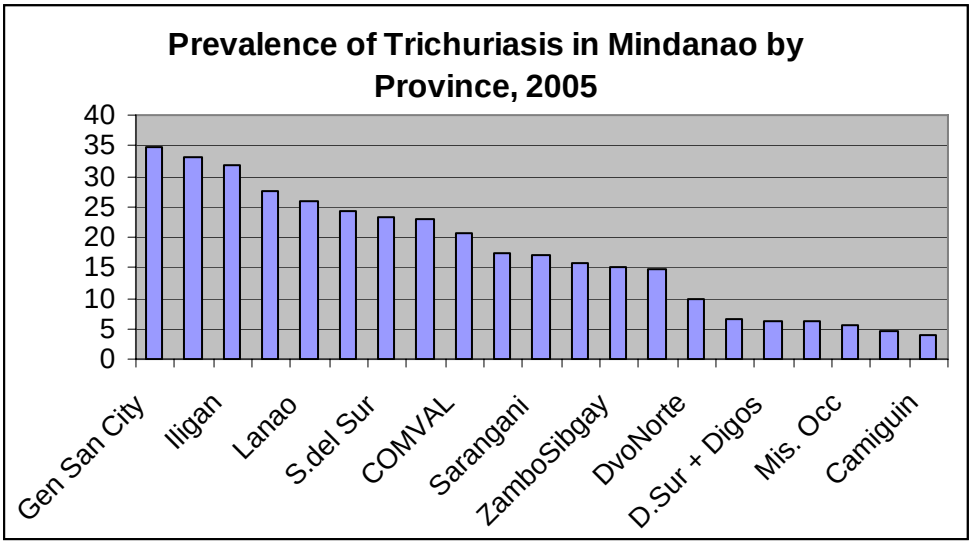

Figure F-1

Province	Prevalence (%)
Gen San City	34.7
S.del Norte	33.1
Iligan	31.7
Zambo City	27.6
Lanao	25.8
Mis. Or	24.3
S.del Sur	23.3
S.Cotabato	22.8
COMVAL	20.6
Marawi City	17.5
Sarangani	16.9
A. del Sur	15.9
ZamboSibgay	15
S.Kudarat	14.9
DvoNorte	9.7
A. del Norte	6.7
D.Sur + Digos	6.3
N. Cot + Kid	6.2

Mis. Occ	5.7
Bukidnon	4.7
Camiguin	3.9

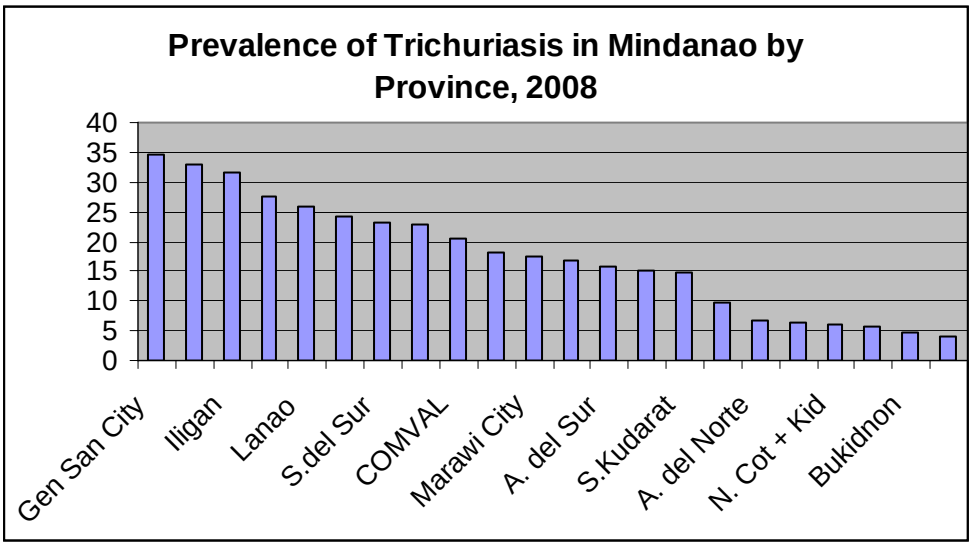

Figure F-2

Province	Prevalence (%)
Gen San City	34.7
S.del Norte	33.1
Iligan	31.7
Zambo City	27.6
Lanao	25.8
Mis. Or	24.3
S.del Sur	23.3
S.Cotabato	22.8
COMVAL	20.6
Maguindanao	**18.28**
Marawi City	17.5
Sarangani	16.9
A. del Sur	15.9
ZamboSibgay	15
S.Kudarat	14.9
DvoNorte	9.7
A. del Norte	6.7
D.Sur + Digos	6.3
N. Cot + Kid	6.2
Mis. Occ	5.7
Bukidnon	4.7
Camiguin	3.9

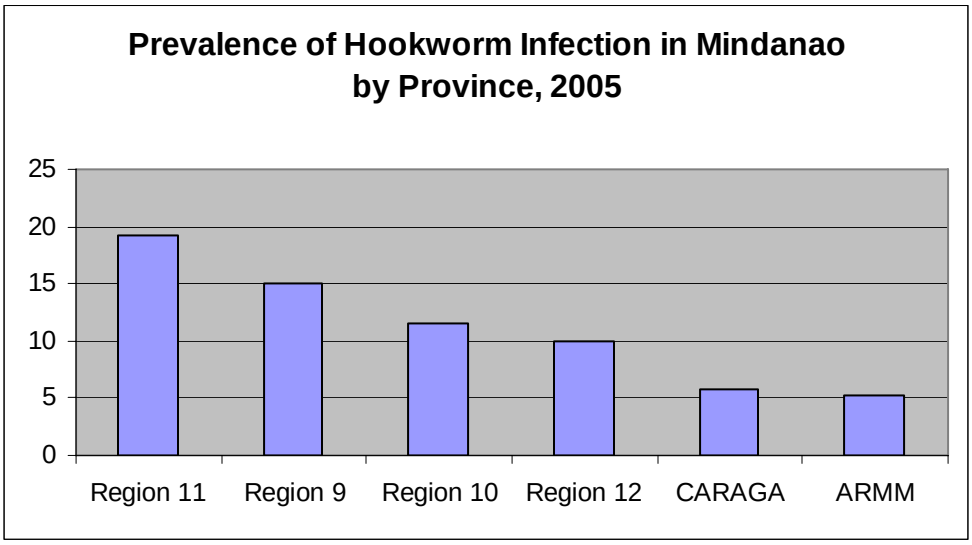

Figure G-1

Regions	Prevalence (%)
Region 11	19.2
Region 9	15.1
Region 10	11.6
Region 12	10
CARAGA	5.8
ARMM	5.2

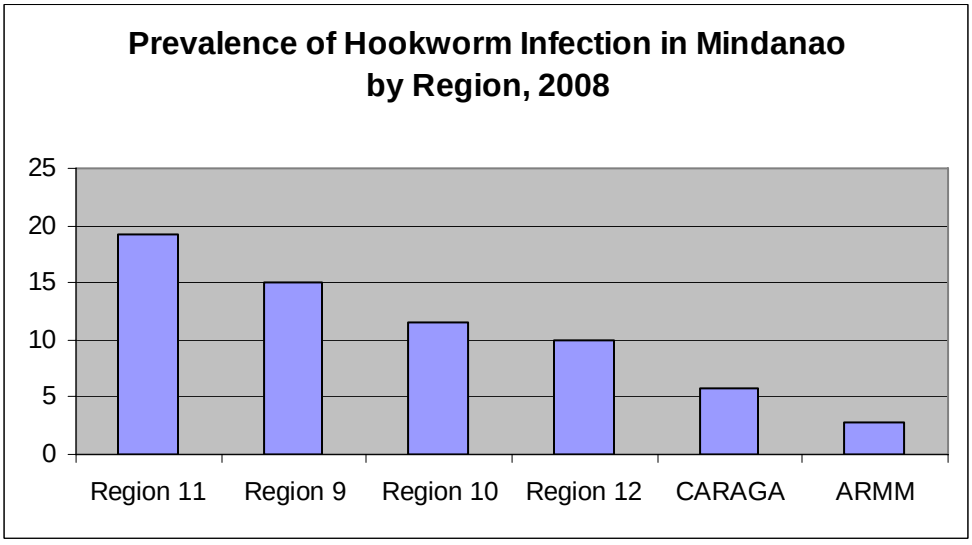

Figure G-2

Regions	Prevalence (%)
Region 11	19.2
Region 9	15.1
Region 10	11.6
Region 12	10
CARAGA	5.8
ARMM	2.76

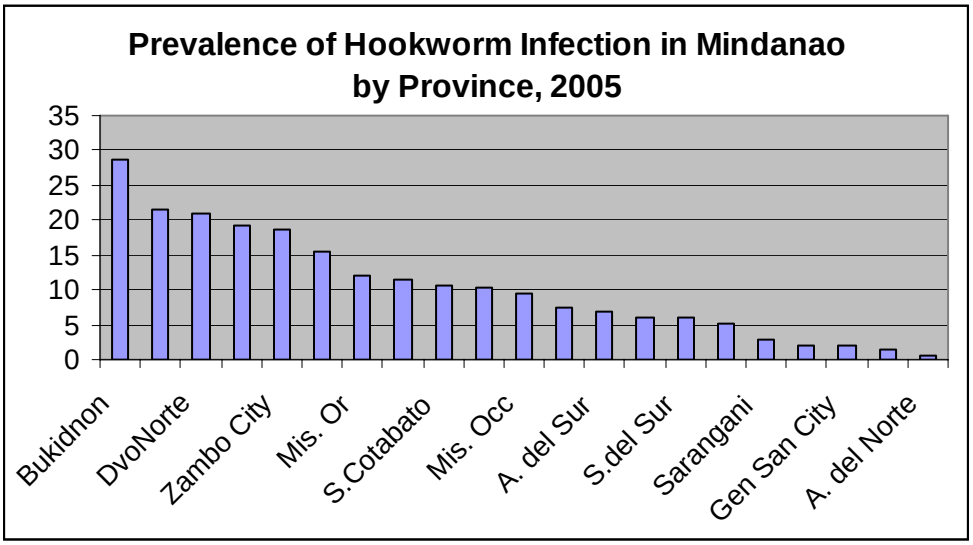

Figure H-1

Province	Prevalence (%)
Bukidnon	28.7
COMVAL	21.4
DvoNorte	20.8
N. Cot + Kid	19.1
Zambo City	18.7
D.Sur + Digos	15.6
Mis. Or	12.1
ZamboSibgay	11.6
S.Cotabato	10.7
S.del Norte	10.4
Mis. Occ	9.4
Lanao	7.6
A. del Sur	6.9
S.Kudarat	6.1
S.del Sur	5.9
Marawi City	5.2
Sarangani	2.8
Camiguin	2

Gen San City	2
Iligan	1.3
A. del Norte	0.6

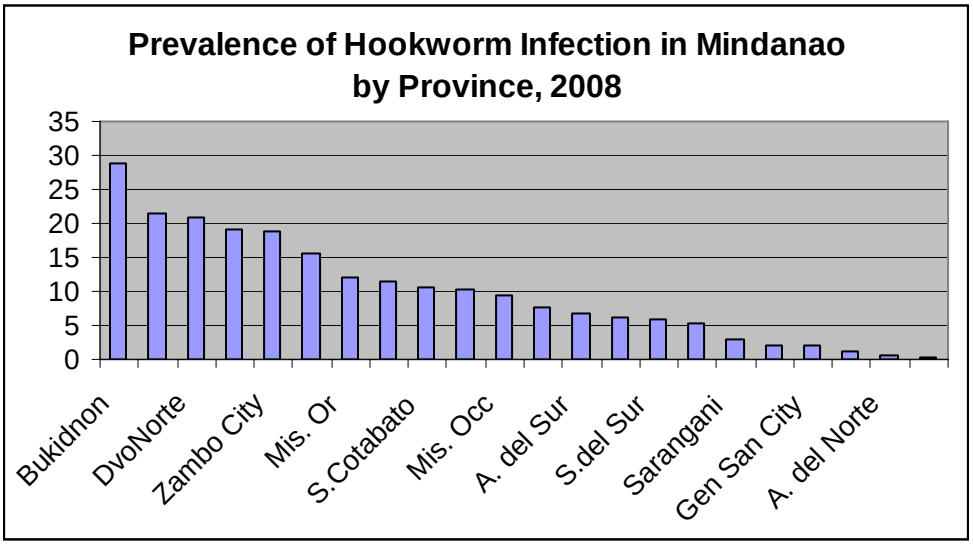

Figure H-2

Province	Prevalence (%)
Bukidnon	28.7
COMVAL	21.4
DvoNorte	20.8
N. Cot + Kid	19.1
Zambo City	18.7
D.Sur + Digos	15.6
Mis. Or	12.1
ZamboSibgay	11.6
S.Cotabato	10.7
S.del Norte	10.4
Mis. Occ	9.4
Lanao	7.6
A. del Sur	6.9
S.Kudarat	6.1
S.del Sur	5.9
Marawi City	5.2
Sarangani	2.8
Camiguin	2
Gen San City	2
Iligan	1.3
A. del Norte	0.6
Maguindanao	**0.32**

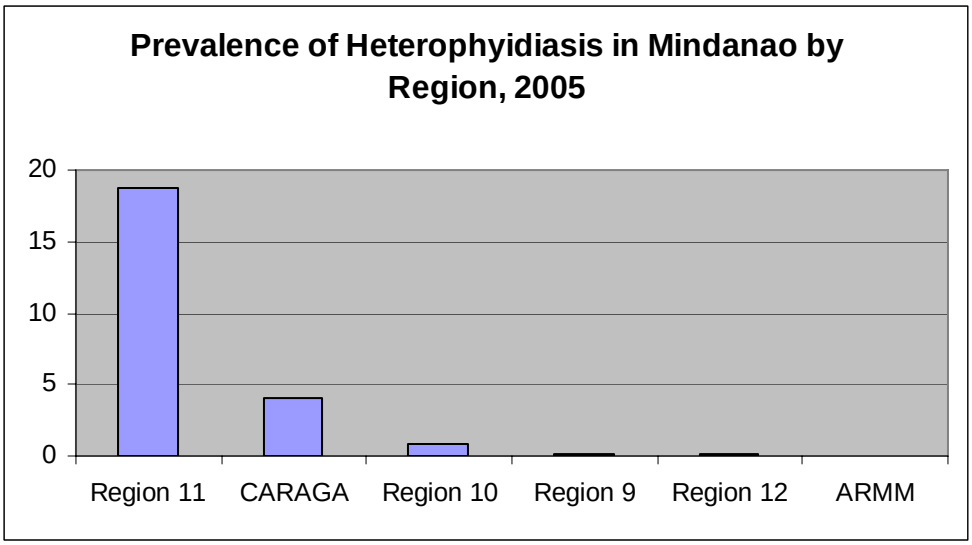

Figure I-1

Regions	Prevalence (%)
Region 11	18.7
CARAGA	4
Region 10	0.8
Region 9	0.2
Region 12	0.2
ARMM	0

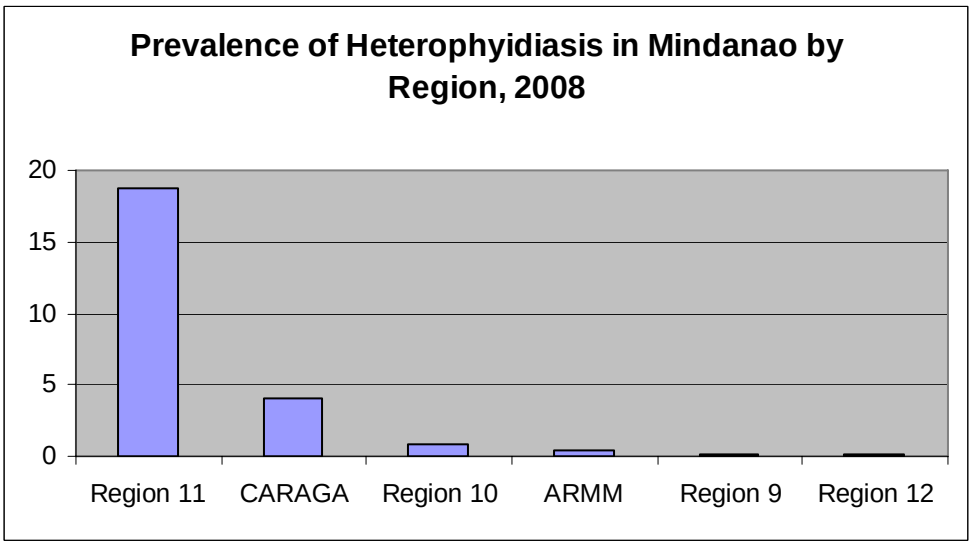

Figure I-2

Regions	Prevalence (%)
Region 11	18.7
CARAGA	4
Region 10	0.8
ARMM	0.395
Region 9	0.2
Region 12	0.2

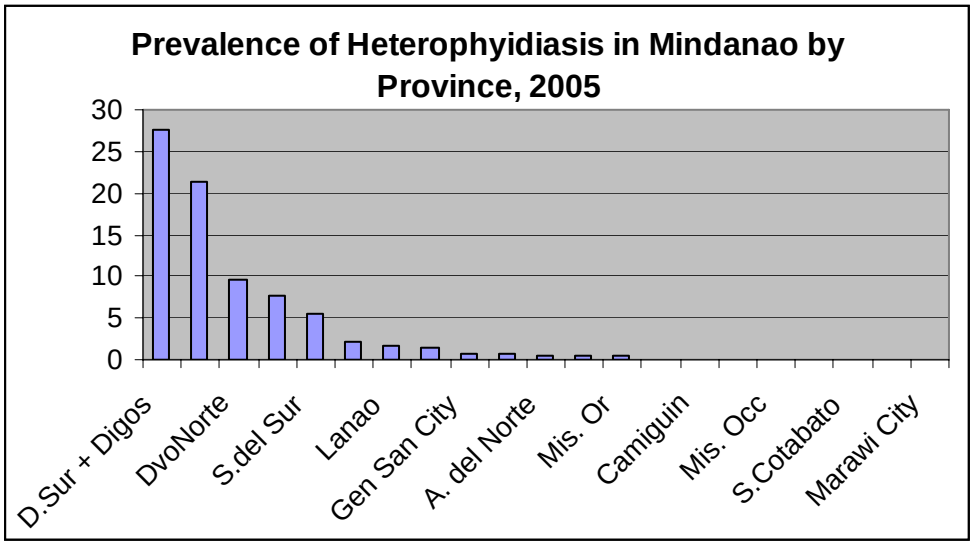

Figure J-1

Province	Prevalence (%)
D.Sur + Digos	27.5
COMVAL	21.3
DvoNorte	9.6
A. del Sur	7.7
S.del Sur	5.5
Bukidnon	2.2
Lanao	1.7
S.del Norte	1.4
Gen San City	0.8
Sarangani	0.8
A. del Norte	0.6
Zambo City	0.4
Mis. Or	0.4
ZamboSibgay	0
Camiguin	0
Iligan	0
Mis. Occ	0
N. Cot + Kid	0
S.Cotabato	0

S.Kudarat	0
Marawi City	0

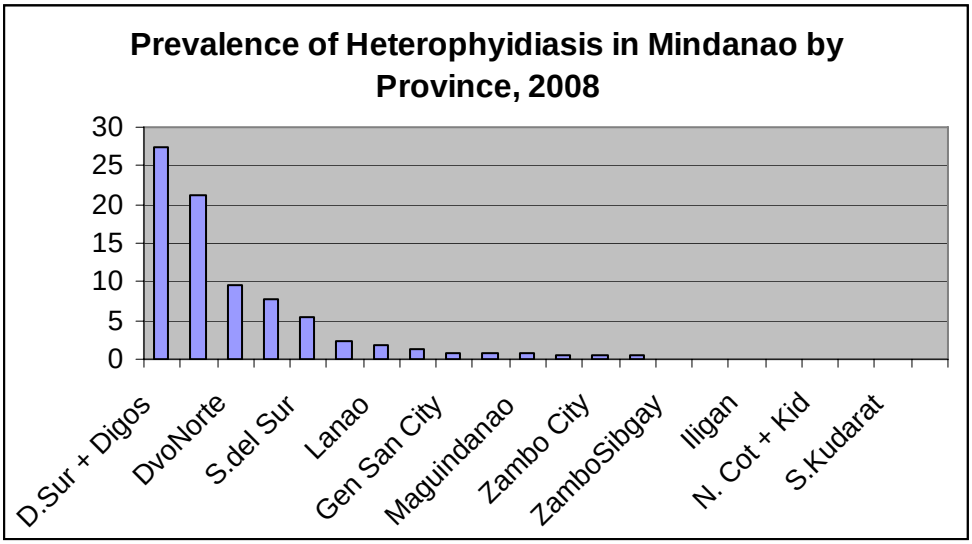

Figure J-2

Province	Prevalence (%)
D.Sur + Digos	27.5
COMVAL	21.3
DvoNorte	9.6
A. del Sur	7.7
S.del Sur	5.5
Bukidnon	2.2
Lanao	1.7
S.del Norte	1.4
Gen San City	0.8
Sarangani	0.8
Maguindanao	**0.79**
A. del Norte	0.6
Zambo City	0.4
Mis. Or	0.4
ZamboSibgay	0
Camiguin	0
Iligan	0
Mis. Occ	0
N. Cot + Kid	0
S.Cotabato	0
S.Kudarat	0
Marawi City	0