

## Research Article

# Partiality and Accountability in Patterning Schistosomiasis Transmission in the Gezira Irrigated Scheme in Sudan

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Submitted: 07 May 2018

Accepted: 30 May 2018

Published: 31 May 2018

ISSN: 2373-9282

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## Keywords

- Schistosomiasis; Irrigated agricultural schemes; Patterns of transmission; Gender and class; Sudan

## Abstract

**Background:** Although methods of schistosomiasis transmission are well documented, limited evidence exists on transmission patterns across gender and class. This study aims at joining force to the efforts trying to situate water-related behavior relevant to the transmission of schistosomiasis to its socio-cultural context. It does so by targeting gender variations in relation to knowledge and behavior relevant to the transmission.

**Methods:** Fifty five boys and girls at basic school aged (8-15) at Habiba basic school at Kamleen Locality were chosen purposively in accordance to the written consent they provided. The study implemented ethnographic methods for collecting data.

**Results:** Knowledge about the pathological causes of schistosomiasis among both boys and girls was lacking but the clinical manifestation is partially recognized (blood in urine and painful passing of urine), yet children's explanation of these symptoms interfered with cultural elements in the context of the village and how the villagers relate to their social world in general. Considerable variation in relations to water-contact behavior associated with gender and types of activity conducted by each group were recorded.

**Conclusion:** One point of departure between boys and girls at school age in relations to the schistosomiasis infection was that boys reflected knowledge about the snail ecology in water; however association of such knowledge to health or schistosomiasis transmission was missing in the case of both categories of informants.

## INTRODUCTION

Schistosomiasis commonly known as bilharzias is one of the most important public health problems of tropical and subtropical regions. The disease is caused by a trematode helminth and transmitted by snails. Three major genera of the parasite cause the disease in man. In Sudan schistosomiasis haematobium and schistosomiasis mansoni cause the disease. An important era in history of schistosomiasis in the Sudan began in 1925 with the building of Sennar Dam on the Blue Nile and the opening of the Gezira Irrigation Scheme. The Gezira Irrigated area lies between the Blue and White Niles occupying about five million feddans (1.0 feddan = 1.38 acres) [1].

In 1997 the Blue Nile Health project was established to control water associated disease in the Gezira irrigated area. The 10-year project adopted a comprehensive strategy including improvement in water supply, sanitation, health, education, community participation and primary health services. The Blue Nile Health Project made significant impact on water associated diseases.

Schistosomiasis continues to be a scourge of the health of people living in sub-Saharan Africa with a yearly ascribed death rate of over 200,000 persons [2]. It is thought to have affected

the peoples of Sudan for many centuries [3]. In the 1930s, the conversion from traditional flood irrigation to perennial irrigation after the construction of Sennar Dam led to huge human population mobility, intensive agricultural activities and frequent- prolonged water contact [4]. Consequently, infected cases could be detected in all parts of the Sudan except the Red Sea State [5]. The disease is creating a global burden [6] King et al. 2005), and researches done on the area suggested that schistosomiasis has significant impact on multiple dimensions of human performance both during childhood and later adult life [7-9]. The Transmission procedure itself is documented to be the result not only of interplay between humans, snails and parasites, but also of complex demographic, environmental, biological, socioeconomic and cultural processes [10, 11]. Children at school age, who live in such endemic areas, are at high risk of infection as they tend to swim and bathe in water canals and get exposed to the infective cercariae [12,13] As well, lack of hygiene and play habits in infested water make them especially vulnerable to infection. As such, inadequate knowledge and improper practice in relations to schistosomiasis contribute to maintain the infection cycle [12]. In the late eighties it was documented that in Egypt, Sudan and North-East Brazil the work capacity of rural inhabitants was severely reduced due to weakness and lethargy caused by the disease [14-16].

A recognized example that worked to reduce the prevalence of schistosomiasis was the Blue Nile Health Project which developed a comprehensive strategy for controlling the major water-associated diseases in irrigation schemes. The 10-year program targeted the Gezira irrigation system-area. The methods used for the control of the water-associated diseases emphasized permanent improvements in water supply and sanitation, health education, community participation and primary health services [17,15,13].

After the collapse of the Blue Nile Health Project, attempts had been exerted to fight schistosomiasis in the country. The efforts included the launching of the National Schistosomiasis Control Program supported by local and international funds, yet the disease has not been controlled. In 2010 scientists screened children at school age for schistosomiasis at different sites at Gezira Scheme and high prevalence of infection in 9.2% of the examined population continued to be discovered [18]. One reason for the persisting of the prevalence is that the approach to prevention and control of the disease has always been top-down and non-integral [13]. This implies that local strategies are planned at the National Level with little or no field research and without taking into consideration sociocultural processes relevant to the disease.

From a macro view the study feeds into an integrated project with the goal of detecting prevalence of schistosomiasis in Gezira irrigated area in Sudan, conducted by Ahfad University for Women in cooperation with the State Ministry of Health in the period between February-December 2016. The current study seeks at improving public understanding of the different children at school age risk behavior relevant to water-related diseases by exploring knowledge, beliefs and practices in relations schistosomiasis-infection and situated there in the sociocultural context of the area. The main objective is to reflect health relevant behaviors across gender and class of children at school age at Habiba and Hilat Dauod villages in Kamleen locality.

## DESIGN AND METHODS

### The study area

Habiba village at Kamleen locality<sup>1</sup>, Gezira State were chosen purposively as a site for conducting the research. A base line survey conducted to identify infection prevalence of Gezira irrigated scheme [19] reflected that Habiba village displayed the highest rate of schistosomiasis infection among school children 8-12 years (Table 1). Most of the infected children were coming from Hilat Dauod Cambo<sup>2</sup> in the neighbourhood to Habiba village

<sup>1</sup> The mixed school from which the children were selected is located at Habiba village. Children from both villages Habiba and Hilat Dauod attend the basic school at Habiba village. Thus children from both localities are targeted at Habiba Basic School. The school is 2 km away from Hilat Dauod. Children from Hilat Dauod come walking all the way to Habiba to attend the school (see map 1).

<sup>2</sup> Cambo plural cambos is the indigenous name given by the villagers to mean the residential-camps of the migrants. The initiation of the Gezira irrigated 1925 witnessed influx of tribes from western Sudan to the Gezira scheme to work in the Arab irrigated farms. The Arabs landowners provided housing for the new comers near the irrigated farms with minimum or no services. The migrants groups continued to live in the cambos even after the deterioration of the Gezira irrigated scheme claiming rights to the land due to the prolonged residency in the place

and trace their origin to the tama tribe of western Sudan. Children from both villages: Hilat Dauod and Habiba attended school at Habiba village. The school is located at a walking distant to the village clinic.

The table shows that Habiba village represented the highest infection level about 92% in relation to the examined children (n= 50). Such results reflect a large gap on the health policies of elimination which depended on chemotherapy-intervention with no education component.

There are three elementary schools in the village as follows: One mixed school, one boys' school and one girls' school.

Children are chosen from the mixed school. It has got eight classes constituting the basic education for children in the Sudanese system of education.

Habiba village in Kamleen locality is located between Latitude 15.26/15° 16' 6.0E-4" and Longitude 32.71 / 32° 43' 0.0012"; is occupied by Arab ethnic groups who trace their origin to the Husaynat, the Dabaseen, the Kawahla and the Hasaniya tribes. These Arab tribes resided Sudan for a prolonged periods of time and claim their possession to the land. They practice agriculture, husbandry and commerce for their livelihood.

A landmark in the history of these tribes was the construction of Sennar Dam and the development of the Gezira Scheme. The Sennar Dam feeds the arbitrary canals extending 1,020,199 feddans through the gravity down flow of water for the purpose of irrigation for the production of long-staple cotton and various subsidiary crops [1]. The introduction of the irrigation canals globalized agricultural activity in the area. The traditional subsistence farming and crop growing turned into cultivation of export orientated crops which required a year round irrigation. The farming population had, to cope with the new way of life, by increasing exposure of the water-related activities. On the other hand, those acts created opportunities for seasonal workers that migrated from different parts of the Sudan particularly the western region to provide labor force for the cultivation of the long stable cotton and other commercial crops. One example of these migrations turmoil is tama tribe migrants who settled in the cambo near the agriculture fields and trace their lineage to an ancestor named Dauod after which the settlement area was named "Hilat Dauod". Hilat Dauod extends two km parallel to Habiba village.

Poverty and poor socio economic conditions characterize Hilat Dauod houses and lanes between houses. Hilat Dauod lack many social resources which are available in Habiba village such the Health Center, schools, electricity and water resources. In both villages rural accessibility and connectivity are inadequate. The nearest living street is two km away to the North of both villages.

Snail survey was conducted in the three water resources in

and the services they offer to the area through the agricultural labor force. The current situation is as follows: Arab landowners living at Habiba in the Northern part of the area enjoying services such as health center, schools, pipe-water at home and resisting any development project to be offered to Hilat Dauod in the neighborhood and with the Arabs striving to retrieve the cambos back from the migrant tribes and their wish to kick them out of the area.

**Table 1:** Prevalence of schistosomiasis in primary school children, Kamleen Locality, Gezira State, Sudan in a study conducted 2012 by The Gezira Ministry of Health.

Overall	Prevalence %		Overall	Positive	Examined		School
	<i>S.haematobium</i>	<i>S.mansoni</i>	Positive	urine	Stool		
16.4	0	16.4	10	0	10	61	1- Algalgala
20	0	20	10	0	10	50	2- Aljimeaby
20	0	20	12	0	12	60	3- Abo roos
8	0	8	4	0	4	50	4- Al rehana
41.5	0	41.5	22	0	22	53	5- Markarka
18	6	12	9	3	6	50	6-Al jamaloon
92	90	34	46	45	17	50	7- Habiba
9.6	1.9	7.7	5	1	4	52	8-Al farajeen
36	26	16	18	13	8	50	9-Kab aljidad
18.7	10.4	8.2	9	5	4	48	10- Al Laota
20	0	20	10	0	10	50	11- Bit al haj
18.2	7.3	10.9	10	4	6	55	12- Azrag
26.2%	11.3	17.9	165	71	113	629	Total

Resource: [19]

**Table 2:** Summary of knowledge and practices relevant to schistosomiasis infection across gender.

Pattern	Girls		Boys	
	Habiba	Hilat Dauod	Habiba	Hilat Dauod
Signs/Symptoms of the disease	Stomach ache	Stomachache, fevers	Blood in urine and stomachache	Blood in urine, vomiting, big abdomen
Causes	Swimming in the canal	Bacteria in the canal	Contact with the infected water	-Swimming by the edge of the canal -Urinating and defecating near the water
Misconception in relations to causes and symptoms	-Dirty water causes the disease -Blood in urine is always relevant to boys and girls maturity	- Blood in urine is always relevant to boys and girls maturity	-Dirty water at the edge of the canal -Drinking infested water -Boys maturity	Boys' maturity
Risk behavior		-Doing laundry -Fetching water for housework Hilat Dauod Agricultural activities	Sometimes swimming in the canal	Doing laundry, fishing and swimming
Beliefs	-Normal process of the growing up -No need to be treated -Affects males and females -Normal illness Hilat Dauod -The infection took place by exposure to bacteria in water	-Normal process of maturation for both gender -Moving organisms in water "wad el moyah" (not a problem) -dirty water is not a problem -Cooking needs boiling water not drinking water	-symptoms (blood in urine) are similar to menstrual cycle and misconceived as being the symptoms of adolescent of boys as well  - Blood in urine is not dangerous -Blood in stool is often misconceived with dysentery	Normal process of maturation -Moving organisms in water "wad el moyah" (not a problem) -dirty water is not a problem -Cooking needs boiling water not drinking water
Symptoms	Blood in urine stomach pain	-Blood in urine -sever pain in stomach -headache -vomiting	Sever stomach pain, blood in urine are relevant to schistosomiasis infection	-Blood in urine -sever pain in stomach -headache -vomiting
Medicine	boiling the leaves of the neem plant <b>Azadirachta indica</b> The white tablet ( <i>Praziquantel</i> )	The white tablets, kitchen medicine for unidentified stomach	boiling the leaves of the neem plant <b>Azadirachta indica</b> The white tablet ( <i>Praziquantel</i> )	The white tablets ( <i>Praziquantel</i> )  boiling the leaves of the neem plant <b>Azadirachta indica</b>

the adjacent low-lying area of the canals, where the Dam excess-water accumulates in the three basins formulating the three main canals in the area. Water stagnates along the edges of the canals, and traces of excessive usages by the population for household activities is visible along the edges of the canals, thus it grows to be conducive to lush vegetation duckweed/water Lettuce (*Pistia stratiotes*) and provides an excellent habitat for the snail intermediate host (Figure 1 & 2).

### Sampling process

Children were first met at school where the written consents and signature of the parents' representing their agreement or finger prints as consent for the children to participate in this research were collected. Only children who had the parents' consents were collected are chosen purposively to participate in the study. In the process, 45 pupils were targeted as follows: 25 boys and 20 girls.

Further, a second group of children at school age were met outside the school near the canal while they were fishing and fetching water for the household activities.

The researchers identified the group to be an accidental sample who could share their experience to the study. As such the researchers had to take the consent of an adult relative happened to be around or in the neighborhood. For some children, the researchers had to visit the agricultural site or to go with the child back home to meet the guardian or an adult relative. The group ended up with 10 children whose age ranges was between 9-15.

The total number of children targeted by the study thus grew to be 55 participants.

### Tools of data collection

The study applied ethnographic method in the process of the field activities. Three tools of data collection were implemented to collect data from the target groups namely: Focus group discussion, interviews and photography.

Five focus group discussions (three with boys and two with girls) were conducted in the school with the boys and girls separately<sup>3</sup>. Each group consisted of 8-9 pupils making a total of about 45 children altogether. As well focus group discussion was conducted with the children who were met accidentally while they were fishing in the canal. The total number then grew to be 55 children. The duration for each focus group discussion was between 45-55 minutes. The researchers acted as moderator for the conversation. The objectives of the study were made clear to the children and it was emphasized that the results would help in promoting understanding regarding schistosomiasis.

The duration for the focus group discussion was indicated by engagement questions which took around 20 minutes. During this period the researchers asked the children about their knowledge of the disease and the symptoms as they recognized it such as

identification of the parasite penetration to the skin and the ways they differentiate it from other diseases.

The second discussion questions took place for an another duration of 20 minutes whereby the children were asked about the water related activities in the canal and duration they take as they are doing the activities and how they do it, as well as the preferable time to conduct water related behavior.

For the third group of questions the researcher took about 15 minutes concentrating on summing up discussion and giving every child the opportunity to share his or her experience, etc.

Data collected through the focus group discussion was further blended with interviews with 8 pupils (four boys and four girls), who participated in the focus group discussion. The interview took place at the premises of the Health Center at Habiba village in order to develop an integrated picture of the patterns of knowledge and practices across gender in the relations to recognizing the disease and the medical seeking behaviors.

Photographs were taken to document relevant processes related to the water risk behavior as well as non-structured observation conducted throughout the study.

### DATA ANALYSIS AND DISCUSSION

Data was first transcribed on the local language (Arabic) then translated into English. The content of the focus group discussions and the interviews were sorted into qualitative data in trying to formulate patterns of what the participants displayed in their accounts. Analysis constituted, as well contents of the children's accounts by identifying phrases with contextual connotations which were pulled as illustrative quotes from the discussion process.

During the focus group discussion the researchers identified variations in the water related behavior among male students from Hilat Dauod and Habiba villages and variation in relations to the water contact behavior across gender.

Attitudes, knowledge and beliefs relevant to schistosomiasis were patterned into three themes for both groups namely: Swimming and water related occupational activities, defecation and urination behavior, fishing, knowledge of the ecology and knowledge relevant to the treatment. The researchers tried to situate knowledge and experiences displayed by children into the socio-cultural context of the community and the everyday-life experience of the population and their relations to their cultural context in general.

#### Swimming and water related occupational activities

Boys from Hilat Dauod viewed swimming in the infected canal (see image) [snail collected] to be "unavoidable". They unanimously agreed that, they bathe in canal during the hot day. An eleven years old boy stated sarcastically, "*It is too hot. We walk home passing the canal, it is irresistible.... to walk by the canal and not to jump inside*".

Children identified that there is no realistic alternative to swimming in the infected canals during a hot summer day after returning from school; or in using water for making green brick which is used for house constructions to make living. Green brick

<sup>3</sup> In the context of the main project school children who were chosen purposively and were asked to bring their urine sample for the clinical examination at Habiba Health Center. There, the researchers conducted the focus group discussion with the boys and girls who agreed to participate in the research and share their experience to the study.





Figure 1 Snails.



Figure 2 Snails.



Figure 3 The big water bug.

is a commodity used by people in the area, particularly Hilat Dauod to build houses. Water is fetched from the canal for the purpose.

Alternatively, green brick is not a commodity at Habiba village where many houses are built with concrete or manufactured brick. Pipe-water is used for the building activities. Houses grew to take modern styles and blacksmith shops are scattered in the

area; whereby their work is reflected in many houses adopting iron outdoors instead of the wooden outdoors characterizing Hilat Dauod houses.

Girls from Habiba do not go to the canal. They use water pipes at home. They are not involved in the art of making bricks. As early as the age of seven, girls in both villages are confined to the private sector. They are rarely seen in the streets before or after school time. Swimming falls into the socially shameful act for girls who are at the puberty stage. In response to my inquiry, "Do you swim in the canal?" A twelve-year-old school girl informed, "It is a miracle that my father allowed me to attend the school and did not insist that I get married to any of my cousins, this act (swimming in the canal) is not for girls!"

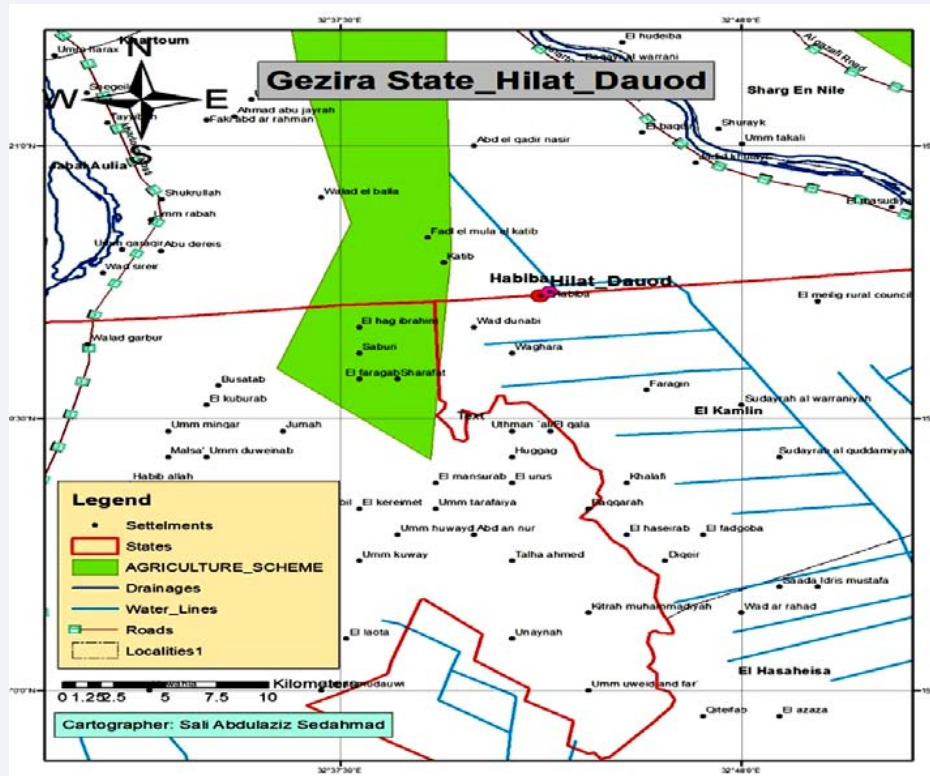
One girl from Hilat Dauod said, "We are not allowed to go outside the house let alone to swim in the canal. Another girl declared, "When I go home from school, the first thing to do is to fill the *zir* (traditional water containers made of clay)<sup>4</sup> with water, so I go and fetch water from the canal that my family members find cold water to drink when they come back". One relevant context is related to the prevailing gender represented by the division of labor that determines women's primary responsibility for fetching water to the household. Gender systems also determine the distribution of power between men and women. Girls at the adolescent's age are confined to the private sector. They are attached to their mothers and start to be prepared for the prospective motherhood roles. Necessity due to the fact that pipe water is not connected to the residences and water has to be fetched from the canal; girls at the school age transmit water from the canal to the house. The activity goes in line with their traditional role of taking care for the internal family processes. The boundary between males and females was drawn firmly and deeply embedded in both views of the cosmos and the social structure. The most visible expression of this boundary is the social segregation between boys and girls. That was a practical demonstration of the notion that an ordered society depended on maintaining boundaries that had been ordained by God.

In the process, drinking infected water is not considered a problem. Water for the household activities and for drinking is purified in the *zir*. However, the target children labeled the small organisms that are seen running in the cup of water as *wad el moyah* literally meaning (water children) and perceive

<sup>4</sup> The *zir* functions as a container made locally to keep water clean, pure and cold for the household uses.



Figure 4 Neem.



Map 1 Cartographer Salli Abdulaziz Sedahmad.

no problem in drinking it. Cold water rather than pure water is sought for.

Mothers at Hilat Dauod work in the field growing crops and conducting different activities and are joined by their daughters in the field after school. The researchers realized a girl from Hilat Dauod with a wound in her finger. The girl expressed that she goes to the field after school where she joins her mother who works there.

At Habiba village boys reported that they do not take their bath in the canal at mid-day. Swimming in the canal was not considered a necessity for this category of boys for three reasons:

1. They do not live far from school as boys from Hilat Dauod who have to walk back home nearly 1.5 to 2 km from school and back to their house.
2. Most of them do not pass by the canal as they get back home after school.
3. Houses in Habiba village unlike Hilat Dauod are equipped with pipe water.

Thus, the weather conditions, water availability at home and proximity to the canal recognized to be decisive factors in determining water relate-behaviors in a hot day in the case of boys from Hilat Dauod.

Swimming involves immersing of the whole body in water. Boys from Hilat Dauod reported that sometimes before swimming they do their laundry because they will use the cloths

for school in the following day. The activity is done at home for those children from Habiba.

### Defecation and urination behavior

Boys from both sites: Hilat Dauod and Habiba denied that they defecate or urinate nearby the canal. However, the researchers preferred to shift asking this question from the focus group discussion to the interviews with the individual boys. The question falls into the zone of what is considered an inappropriate behavior and was difficult to get a clear cut response, although through observation the researchers identified urine and stool traces by the bank of the canal. This pattern of behavior is exclusively relevant to boys, and when girls were asked to check up for schistosomiasis by bringing urine sample, they chose to use latrines in the neighborhood in Habiba village and did not choose to use the latrine located in the health center which was used by the boys for the same purpose. Upon bringing the samples' containers they hide the containers filled with urine under their scarf as, "the content is part of the interior body and should not be revealed to the observers and foreigners' scrutinization". As well a distinctive border between how geographical locations are distributed between boys and girls.

### Fishing

Fishing is identified as an important water-related activity as revealed by boys from Hilat Dauod. Mid-day was the time preferred for fishing. However, boys from Habiba reported that they do not go fishing so often. Boys from Hilat Dauod considered





Image Macroscopic Haematuria.

fishing a survival strategy necessary to be conducted against poverty and scarcity of food. Fish provides a cheap meal to kill their hunger. When the researchers conducted the study it was "okra harvesting season". Harvest is mainly done by female-villagers, for that reason mothers were usually at the agricultural sites when the boys go home at the end of the school day. Mothers at Habiba village do not go harvesting. Thus, children find mothers at home after school, a twelve year old boy asserted, "When I go home my mother gives me *madida* (an indigenous drink made of flour and water), this kills the hunger immediately". The researchers observed that hands are also so often plunged in water during the activity to pick the snails; the flesh of snails is used as bait for the fishing activity.

### Knowledge of the ecology

Boys at school age reflected knowledge of the ecology processes in relation to schistosomiasis host factors.

Boys who were fishing near the canal when shown the water bug (Belostomatidae) collected from inside the canal (see image), they cried of joy and showed that they know that the bug preys on snails. An eleven year boy shouted, "Threw it away from the canal, it bites humans and eats the snails. We use the flesh of the snails for fishing". Yet, boys do not identify that this ecological processes (to throw the bugs away of the canal) is favored by health workers who strive to eliminate the snails. (Image of the bug)

Water bug is also known to girls from Hilat Dauod who does laundry activity in the canal. A twelve year old declared, "Bugs are frequently found here in the bank of the canal".

Opinions raised in the focus group discussion sessions from boys demonstrated misconception in relation to the quality of water and its relation to the transmission of the schistosomiasis. Boys from both locations Hilat Dauod and Habiba stated that they avoid the canal where the water is visibly dirty<sup>5</sup>. One boy from Hilat Dauod reported, "I go away from the grass and dirt and bathe in the deep canal". A ten-year old stated, "... I bring the water from

the middle of the canal not from the beach, water from the middle is *taharah* (literally means holy and not polluted by human beings and animals) because there, it is free of dirt and living organisms, but when I fish I come near the beach where I can get the worm which I use to attract fishes".

The concept of *taharah* or "holly water" is a reflection of teaching of Islam where the clean pure and unpolluted water was described as appropriate for Muslims to use before conducting the religious activities.

The act of fetching water from the middle of the canal is considered necessary for prayer rather than to avoid risk of infection. The act demonstrates that although knowledge of the exact site is known, it is not considered enough to prevent boys risk behavior. Prayers are considered important activity necessary for searching clean water source. Religion in such context represents the duality of relating to water in relations to social practices. Boys manifest knowledge of the importance of the quality of water. The anthropological dichotomy of folk and elite Islam is relevant to this background [20], reflected on the concept of folk Islam as being interpreted in the context of rural community as orthodox. Health in that context was given a lower status of importance and an indifferent attitude when compared to religion. Boys from Hilat Dauod reported that they use water from the canal for making brick, watering animals, cleaning and bathing. They boil water for cooking but not for drinking. Drinking water is put in the *zir*. Laundry is often done by the canal location. It is a time where the mother may socialize. The spatial pattern is especially true for the people in Hilat Dauod. The agricultural location is another socializing spot.

### Knowledge of the infection in the context of culture

Boys from both geographical locations displayed minimum knowledge in relations to how the infection takes place. Similes from the ways of infections of other known diseases in the area are associated with schistosomiasis infection. One boy from Hilat Dauod stated, "*Bilharzias enters the body only when we drink the water which contains the germ, just like diarrhea*". Another boy from Habiba village responded to the last idea and stated, "... *But this germ of Bilharzias produces intensive stomach pain*". Blood in stool is associated with dysentery and not with schistosomiasis infection among the two groups. One boy from Habiba village explained, "*My brother was suffering blood in stool and stomach pain, the health worker sent my mother to Khartoum to make investigation and he was diagnosed with dysentery*". Other two or three responses confirmed the statement and asserted that blood in stool is a symptom of dysentery, "... *but blood in urine is seen when bilharzias is in the body*".

However blood in urine is not perceived by the different participants to be a dangerous symptom that requires clinical investigation. Children mentioned the symptoms to be associated with schistosomiasis but it seems that through the socialization processes children developed a misconception whereby they held the belief that blood is a manifestation of a dysfunction of the body organs at the same time they know that girls experience puberty through the manifestation of vaginal blood. Blood becomes a sign of transition from childhood to adolescent. Thus the simile is drawn that blood in urine is the initiation of puberty

<sup>5</sup> Drinking water is not considered dirty at any level of pollution which is visible to the eye. Yet, water to be used for different activities is analyzed carefully by the children to identify whether it is suitable for prayers and bath or not.

not only for girls but as well for boys. A fifteen-year old school girl consulted the researcher during the interviews stating, "My brother is thirteen years old. My mother keeps him at home and does not want him to go to school like his colleagues because he has no blood in urine... Other boys are approaching puberty their voices and physical bodies started to change, my brother does not".

The inter connectedness of blood with health and identity formation is evidence in this case and the act indicated signs of the prevalence of the disease among these categories of children. Boys who do not display symptoms of blood are reflecting signs of immaturity and casted out of the cultural context of their age group.

The frequent manifestation of blood in boys' urine, who are in the threshold of puberty, is clear in this account when another twelve girls reflected that her fourteen years old brother had been suffering blood in urine for two years but as she said, "This is normal for the age.... just like his cousins".

In this context both boys and girls reinforce their gender identity in the context of the disease. Schistosomiasis examination becomes a battlefield for the both categories of children to display the body as "a cultural text" able to convey meaning that are outside the verbal language [21,22].

Social constructionists Bordo [22] took this theoretical proposition and suggested that the body can supplant language as means of expression and must be read as a text of "femininity and masculinity" rather than a symptom of suffering. The findings are reinforced by the observation procedure when a mother of a school boy consulted the researcher describing the case of her son who as she stated, "was not displaying blood in urine, like the other boys in his age". She then asked for a medicine to enhance blood in urine. In a discriminatory act the boy was alienated from his colleagues who manifested clinical features "blood in urine" sign of schistosomiasis infection.

This perception of how communities contextualize symptoms of diseases was mentioned by [23]; whereby he made a categorization of how communities perceived some of the health problems that affect its members. Cornwell stated that communities perceive illnesses to be either: Normal, real or mere health problem. In the case of schistosomiasis the misconception reflected displayed by boys and girls at school falls into what Cornwell described as perception of what might be considered a normal growth. In such situation physical maturity of boys and girls in their own culture are related to symptoms of blood in urine and the absence of the symptom becomes signs perceived to inhibit this normal process. To the contrary, manifestation of blood in urine became a pride to boys who experience it. Therefore boys came to the center carrying the containers with the blood in urine proudly and submit it to the health workers (image----) assuming that signs of their masculinity had already been declared. On the other hand, girls hide the containers containing their urine under the folding of their scarf that signs of blood –or proof of their femininity- is to be kept to the private sector and the publics do not see it. In that way symptoms of infection with urinary schistosomiasis become an indicator to read the community and its processes in relations to femininity and masculinity, the public and the private and the available

space available to both boys and girls as granted by their cultural processes.

Medicalization of schistosomiasis is often initiated not when blood is recognized in urine or stool, but when those infected suffer stomach pain. Boys and girls mentioned that they usually go to the health center where they get Praziquantel. However, for some of them medication starts at home. One girl mentioned, "When my mother suffered blood in urine and had stomach ache my mother dried neem (*Azadirachta indica*) leaves, boiled it and gave my brother who found it useful to kill the pain".

Whether neem leaves function or not is not clear but the children mentioned that they use the boiled syrup to kill the stomach pain whenever they suffer it.

## CONCLUSION

The result of this research showed a clear convergence not only across gender but as well across class and culture in relations to the manifestation of the infection with schistosomiasis. Water related activities varied in relations to boys from both villages, while in Habiba village occupational activities are not visible at Hilat Daoud the activities are visible because some of the activities are done to earn living after the school-day ends.

Knowledge about the pathological cause of schistosomiasis among both boys and girls was lacking but the clinical manifestation is partially recognized (blood in urine and painful passing of urine). This result brings about the issue of why the disease is not seriously considered by the community. The symptoms become part of cultural context and are favorable in explaining boys and girls natural maturation processes. Campaigns of elimination of schistosomiasis have to take cultural processes in consideration. However, this recognition becomes another point of departure to explain processes of culture such as masculinity and femininity and the public and private and so on. Infection with stool schistosomiasis becomes a point of explaining other relevant diseases such as dysentery.

The paper tried to explain how the context of schistosomiasis, knowledge, perception and attitudes of the disease is actually constructed by the socio-cultural context at Habiba and Hilat Daoud. The result showed a clear convergence across gender in water related activities in Habiba village and Hilat Daoud. Water proximity determines water risk behavior which is associated with boys rather than with girls due to the gender related practices and ideologies which confine girls at the age of puberty to the private sector and boys to the public sector.

## ACKNOWLEDGEMENTS

The study is conducted as part of a project that aimed at studying the prevalence of schistosomiasis in different parts of the Sudan, initiated by The Research Unit at Ahfad University for Women in collaboration with the State Ministry of Health in Sudan.

Ethical clearance was obtained from Ahfad IRB.

The researchers wish to acknowledge the researchers and accept that they are used in this paper.

The researchers are also thankful to Cartographer Salli Abdulaziz Sedahmad for drawing the map for this paper



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### Cite this article

AbuBaker H, & Amin M (2018) *Partiality and Accountability in Patterning Schistosomiasis Transmission in the Gezira Irrigated Scheme in Sudan*. *Ann Clin Pathol* 6(3): 1137.