MENTAL HEALTH AMONG SCHOOL CHILDREN IN KINSHASA, DEMOCRATIC REPUBLIC OF CONGO.

Running title: Child mental health

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ABSTRACT

Introduction: In Africa, little is known about child mental health. This study piloted the Strengths and Difficulties Questionnaire (SDQ) in Kinshasa, investigated mental health problems and the association between these problems and school performance, demographic factors, illness and nutrition.

Methods: An epidemiological survey was conducted with 1187 children, seven to nine years old, recruited from randomly selected schools. Mental health problems were assessed with the SDQ (a behavioural screening tool) administered to teachers. Stability of the factor structure was examined using principal component factor analysis of the SDQ items. The reliability was evaluated using measures of internal consistency of the SDQ scales.

Results: Factor analysis yielded five factors, similar to the published SDQ scales. The internal consistency was satisfactory on all of the SDQ scales. Using the 90th percentile, the cut-off scores were somewhat higher from the published cut-off scores. Poor nutrition, low socioeconomic status and illness were found to increase the risk for mental health problems and low school performance.

Conclusion: SDQ may be considered useful to describe mental health problems among urban African children in Kinshasa. An association between mental health, school performance, demographic factors, illness and nutrition was found.

Key words: child mental health, school performance, Africa, SDQ.

INTRODUCTION

The World Health Organisation (WHO) estimates that about 10-20% of children world-wide have mental or behavioural problems. Furthermore, many of the affected children are neglected and do not have access to appropriate resources for recognition, support and treatment (19). In several studies, the overall prevalence of mental health problems among children in high-income countries like Great Britain (13) and Sweden (3) varies around 10-20%. Similar rates have been reported in non-African low-income countries such as India (12).

In Africa, little is known about mental health problems in children. The few data available from Ethiopia (1) and South Africa (11) describe prevalences in the range of 3-20%, similar to those found in high-income countries.

Different behavioural questionnaires have been used world-wide in child psychiatry to examine mental health profile, but many of them have not been evaluated in Africa yet. Therefore the aims of the study were: 1) to pilot the use of a short child behaviour questionnaire (Strengths and Difficulties Questionnaire, SDQ) in an urban African setting; 2) to investigate the association between abnormal scores (signs of mental health problems) and various demographic factors, illness and nutrition; 3) to investigate whether child school performance was associated with these factors; 4) to investigate whether children with mental health problems have lower school performance than those without such problems.

SUBJECTS AND METHODS

Study area

The Democratic Republic of Congo (DR Congo), formerly Zaïre, is a large country (2 345 000 km^2) in central Africa with an estimated population of 51 million (22). More than 300 local languages are spoken in the whole country. This linguistic variety is bridged both by the use of French as the official language and one of the four national Lingua Franca (Kikongo, Lingala, Swahili and Tshiluba) in each region.

Although, mental health cares have been included among the health policy objectives and priorities, health care is not subsidised or available for all in the DR Congo. The country has only one referral center for neurologic and psychiatric disorders for both adults and children. This university hospital center is located in the capital and is the main academic institution of the country.

The present study was conducted in Kinshasa, the capital city, from July to September 2002. The city lies on the south bank of the Congo River, in the far Western part of the country, which is about 2-3 hours by airplane away from the war-affected area. Kinshasa has an estimated population of 5 million inhabitants and is thus one of the largest cities in Africa. Most of the Congolese ethnic groups, each with their own mother tongue, are represented in Kinshasa. The main communication language for any oral interaction outside the family in Kinshasa is Lingala. French, however, remains the administrative and the most important language in writing, and the educational language used for education from nursery to university level.

Despite the deterioration of the educational system during the 1990'ies resulting from the political instability, children at six to twelve years of age are required to attend school. This is accepted by most parents. The schooling system includes both public and private schools, with public schools being more common. According to the last census, the schooling rate in Kinshasa is 75% (14). This low percentage is due to the fact that education is not subsidized and school fees are paid by parents.

Study population

A cluster sampling procedure was used. Kinshasa is divided into two administrative sectors by the Ministry of Education: Kinshasa East and Kinshasa West with 10 and 14 municipalities respectively. From the two sectors, six municipalities were randomly selected using the basket method. In two baskets, the 24 municipalities' names (10 and 14 respectively) were written on small sheet of papers and from each basket, respectively three municipalities' names were randomly picked out. From the six municipalities, all the 30 primary schools (public and private) were listed and a random sample of 20 schools (10 public and 10 private) was drawn also using the basket method performed in the described manner. Of the 20 randomly selected schools, five schools (four public and one private) were excluded because of lack of lists of pupils that would reduce the loss to follow-up. Thus 15 schools fulfilled the inclusion criteria, of which 10 (five public and five private) agreed to participate in the study (Figure 1); among them one was a girl's school. The five schools (one public and four private) that didn't agree to participate were not different from the 10 remaining schools in terms of population size or schooling program. All pupils in the 10 schools aged from seven to nine years at the time of the survey were considered eligible for the study.

Mental health status

To assess mental health status, the French version of the Strengths and Difficulties Questionnaire (SDQ) available on-line was used (www.sdq.com). The SDQ is a behavioural questionnaire that can be administered to the teachers and parents of 4-16 year old children and to 11-16 year old children themselves. The tool consists of 25 items and yields five scores (hyperactivity, conduct problems, emotional symptoms, peer relationship problems, and prosocial behaviour) with five items for each score. For each item the respondent may answer, "not true", "somewhat true", and "certainly true". A summary score, total difficulties score (TDS), was calculated according to Goodman (www.sdqinfo.com).

Ethical approval from the National Medical Council in DR Congo and the Regional Ethics Committee on Medical Research in Norway was obtained. To avoid some parents' illiteracy in French, the questionnaires were administered only to the teachers in the present study.

General health status

Assessment of the general health, the nutritional and socioeconomic status, and the school performance was obtained from a questionnaire specially designed for this study and given to the teachers. The rating of the general health status (seeing properly on the blackboard, hearing properly in the classroom, diseases known to the teachers, physical disabilities) was obtained answering "yes", "no", or "don't know". The nutritional status was rated from 1 (poor) to 3 (very good), as was socioeconomic status from 1 (low) to 3 (high).

School performance

The average school performance and also specified performance in reading, spelling, writing, mathematics, geometry, and manual work were obtained by rating from 1 (non-optimal) to 3 (optimal). Furthermore, the teachers were asked whether the pupil had repeated a grade or needed extra educational resources.

A pilot study of the questionnaire was carried out with 25 pupils. Prior to the survey, the head master and the parents' committee of each selected school approved the study. Each item of the screening tool was carefully explained to the teachers.

Statistical analysis

Statistical analyses were done in five stages. *First*, a principal component factor analysis with Varimax rotation, including all 25 items of the SDQ questionnaire was performed on all children. This was done to reduce the number of outcome variables and facilitate analysis and interpretations. *Second*, the cut-off levels for males and females were calculated using the 90th percentile for each gender. *Third*, reliability was assessed using the internal consistency (Cronbach α coefficient). *Fourth,* the gender, the nutritional and socioeconomic factors, and illness were subjected to logistic regression analysis with the SDQ Total Difficulties Score (TDS) as the dependent variable. *Fifth*, interaction effects of illness and nutritional status as predictors of abnormal scoring on the TDS were investigated from the multiple regression analyses. This was done by computing a new variable, a product of the illness and the nutritional status variables. Similar procedure was repeated using the socioeconomic variable. The new variable was forcibly entered into the model with prorated TDS as the dependent variable. *Sixth,* the mean school performance within the different groups was compared using the χ^{2} test, and the odd ratio was used for the risk estimate. All analyses were 2-tailed and results were considered statistically

significant with a p-value less than or equal to 0.05. The Statistical Package for the Social Sciences (SPSS) for Windows, version 11.5 was used for the statistical analyses.

RESULTS

Population

A total of 1306 pupils were included and assessed by teachers. The teachers' response rate was 100%. Of the 1306 assessed pupils, 119 were outside the age range (below seven or more than nine years of age) and the total number of eligible children according to age range was 1187: 502 boys (42%) and 685 girls (58%). The mean age was 7.9 years (SD 0.8).

Mental health status

Boys were reported as being more hyperactive than girls, more often fighting, and had more often with hot tempers, whereas girls were reported as more often liked by other children, more attentive, friendly and helpful according to teachers (Table 1).

The principal component analysis of the questionnaire indicated that the Eigen values levelled off at five factors, with the five factors having Eigen values above 1.0. Therefore based on that and the predicted number of factors on theoretical grounds, a five-factor model was chosen, explaining 44% of the total variance. The majority of the items loaded on the published factors with some items also loading on additional factors (Table 2).

The mean scores on all SDQ scales, including TDS, were significantly higher for boys compared to girls (Table 3). Using the 90th percentile (10th percentile for prosocial), we found the Kinshasa cut-offs scores to be somewhat different from the French/British cut-offs scores (Table

3). The reliability analysis showed that the internal consistency of the scales were generally high ranging from 0.66 to 0.81, except for the peer problems scale, which was low (0.35).

In univariate analyses, poor nutrition, low socioeconomic status and illness were found to increase the risk of having an abnormal TDS score. Adjusting for the different variables, only illness remained a predictor of an abnormal TDS score (OR: 3.0 95% CI 1.6 to 5.8, p=0.01) (Table 4). No statistically significant interactional effects were found between variables.

General health status

Difficulties in seeing on the blackboard and hearing in the classroom were reported in 60 (5%) and 31 (3%) of the pupils, respectively. Of the 1187 pupils, 57 (5%) had a disease known to the teachers and only 17 (1%) were reported to have physical disability. The diseases reported were infections in 25 (2%) pupils, 12 (1%) pupils were reported with eye problems, 4 (0.3%) with epilepsy, 4 (0.3%) with mental retardation, 4 (0.3%) with asthma, 2 (0.2%) with speech problems, 2 (0.2%) with caries, 2 (0.2%) with sickle-cell anaemia, and 2 (0.2%) with surgical problems. According to teachers, 37 (3%) were classified as having poor nutritional status, and 103 (9%) were classified as having poor socioeconomic status (Table 4).

School performance

According to the teachers, the mean school performance was 2.1 on a scale from 1 (non-optimal) to 3 (optimal). Of the 1187 pupils, 196 (16%) were scored 1, 667 (56%) were scored 2, and 326 (28%) were scored 3. The mean school performance was comparable for boys and girls, boys performing 2.1 (SD 0.7) compared to girls 2.1 (0.6) (95% CI for difference of means −0.09 to 0.06; p=0.7). For all the six topics, the average ranged from 2.1 to 2.2: reading 2.1 (0.8), spelling 2.2 (0.8), writing 2.2 (0.7), mathematics 2.2 (0.7), geometry 2.1 (0.7) and manual work 2.2 (0.6).

Hundred and fifty-three (13%) pupils had repeated a grade and 581 (49%) needed extra educational resources according to teachers.

Mean school performance on a scale from 1 (non-optimal) to 3 (optimal) was significantly higher among pupils with very good nutritional status 2.3 (SD 0.6) *vs.* pupils with good nutritional status 2.0 (0.6) (95% CI for difference of the mean 0.2 to 0.4; p=0.001) and also significantly higher among pupils with good nutritional status *vs.* those with poor nutritional status 1.6 (0.6) (95% CI for difference of the mean 0.2 to 0.6; p=0.001). Pupils with high socioeconomic status had a higher mean school performance 2.4 (0.6) compare to those with middle socioeconomic status 2.1 (0.6) (95% CI for difference of the mean 0.08 to 0.38; p=0.002). The mean school performance was significantly higher among pupils with middle *vs.* pupils with low socioeconomic status 1.8 (0.7) (95% CI for difference of the mean 0.19 to 0.45; p=0.001).

Using the 90th percentile for the TDS as cut off level for having a mental health problem, we found that the risk for low school performance was significantly higher among children with abnormal TDS compared to those with normal TDS (OR: 7.1, 95% CI: 4.8 to 10.4, $\chi^2 = 122$, p= 0.001). Similar results were found for all the five SDQ scales, with the highest risk found on the hyperactivity scale (OR: 9.5, 95% CI: 6.7 to 13.6, $\chi^2 = 194$, p= 0.001).

DISCUSSION

This is the first epidemiological study evaluating mental health using Strengths and Difficulties Questionnaire, SDQ, in an African urban setting. Factor analysis yielded five factors, mostly similar to the predicted SDQ scales. The internal consistency was satisfactory on all of the SDQ scales, except for the peer problem scale. The 90th percentile cut-off scores were somewhat different from the French/British published scores and varied according to gender. Poor nutrition, low socioeconomic class, and illness were predictors of mental health problems. School

performance was lower among children with poor nutrition, low socioeconomic status and mental health problems.

A weakness of the study was the potential for selection bias. The sampling procedure was designed to minimise selection bias, but also to increase feasibility, thus excluding schools lacking pupils' lists. The sample studied was considered representative for pupils in Kinshasa even though it leaves a small possibility of a systematic selection bias. In addition, choosing the teachers as respondents in a study may decrease the quality of the information obtained, as teachers may know less about a child's health and functioning than parents. We tried to minimize this problem by intentionally using short assessment scales, with for instance only three items for nutritional status and socioeconomic status. The ideal way of assessing behaviour is to ask both teacher and parents (17). However, this is not always feasible and many studies have used teachers as the only informant (21). In the present study, only teachers were involved for several reasons: anticipating a lot more language challenges vis-à-vis the parents, parental literacy problems, and logistic problems in reaching the parents. Primary school teachers who filled out the questionnaires had all completed at least secondary school in French during their training. However, it is well known that the cultural context has a role in interpreting behaviour, leading to a cultural bias. Another possible bias was the fact that each teacher had an average of 30 pupils per classroom, which may have led the teachers to fill out the questionnaires according to a general classroom tendency.

To the best of our knowledge this is the first study using the Strengths and Difficulties Questionnaire, SDQ in Africa. The SDQ is a well-established behavioural screening tool that has been used in different cultures. This tool was found useful in both high and low-income countries in the investigation of child mental health profiles (2, 6). In this study, factor analysis showed that most items loaded on the expected factors, except for the peer items, and two of the conduct items. The factor analysis suggested the hyperactivity scale to be separated into two different

factors in contrast to the published factor. Two of the conduct items loaded on the hyperactivity factor. This finding suggested that teachers were able to differentiate between externalising (hyperactivity and conduct) and internalising (emotional) items. None of the peer items loaded on the predicted factor suggesting that either those items are not appropriate in this population or that children themselves rather than teachers should be considered as better informants when reporting peer problems. The overlap between the items loading on the internalising and externalising scales was very small. This confirms that SDQ items assessing internalising and externalising symptoms do not cross-load (7).

The reliability of the questionnaire and the internal consistency of the scales were satisfactory in general as reported in other studies (16). However, in line with the British studies, the internal consistency was notably low for the peer scale (5). The findings indicate that SDQ may be useful in describing mental health problems in African populations, and further studies regarding validity are welcomed.

The mean scores of the scales, except for the prosocial scale, were higher compared to the published norms from British children (www.sdqinfo.com). However, the boys prosocial and hyperactivity mean scores were comparable to the British norms. Of the five scales, the highest mean scores were on the prosocial behaviour and hyperactivity scales. This indicated that teachers easily notice and tend to report disruptive behaviours, which may be more noticeable in a formal setting such as a classroom. Kolvin et al (10) have reported that teachers tend to focus mainly on antisocial and disruptive behaviour. In addition, these results suggest that child behaviour is subject to change according to settings (8).

In the present study, the 90th percentile cut-off scores were used and some cut-off scores were different from the published French/British cut-offs. The higher TDS cut-off score in this population compared to British/French may indicate a higher frequency of mental problems

among school children in Kinshasa. On the other hand, it could be explained by cultural differences in the description of such problems. Re-standardisation may hide real cross-cultural differences in the prevalence of mental health problems. In addition, higher cut-off scores on the conduct scale and lower on the prosocial scale were found compared to the British/French norms, whereas there were similar for the hyperactivity, emotional and peer scales. The satisfactory internal consistency and the similar cut-off scores on the hyperactivity and emotional scales suggest that the related items properly assess hyperactivity and emotional symptoms.

Using the 90th percentile, the cut-off scores on the conduct, prosocial and TDS scales differed by gender. According to teachers, boys were scored higher than girls, except on the prosocial scale meaning that teachers considered girls as being more prosocial than boys. This is consistent with the findings of previous studies (18). It is known that disruptive behaviours are differently expressed in boys and girls; therefore teachers are more likely to notice externalising problems in boys (20). Our results suggest that the cut-off scores in this population need to be adjusted for gender as recommended by Goodman in different cultures (4).

Poor nutrition, low socioeconomic status, and illness increased the risk of having mental health problems, with illness being the strongest predictor. In line with previous studies, we found that children with diseases, poor nutrition, or from economically disadvantaged families were at increased risk of having mental health problems. It is known that malnutrition, infectious diseases, poverty and social disintegration may affect mental health (15).

We found that school children with mental health problems had a considerably increased risk of low school performance, in accordance with other studies (9, 21). The contrast between the fair to very good school performance reported in the majority of the pupils and the high mean scores in all the five scales and TDS found in this study may be explained by teachers over-reporting symptoms. Alternatively, some items were not appropriate in this population and tend to

over-estimate mental health problems. Teachers reported that every other child was in need of extra educational resources, which also contrasts with the school performance. An explanation to this may be that though pupils perform well in school, teachers think that they can improve their school performance if they have extra educational resources.

To conclude, the findings of the present study indicate that SDQ may be a useful behavioural questionnaire to examine mental health profile of children in Kinshasa, thus further investigations of validity are welcomed. Furthermore, the findings suggest that mental health problems are related to poor school performance, various demographic factors, illness and poor nutrition. Therefore more emphasis on child mental health is needed in order to ensure appropriate recognition and management in this setting.

Acknowledgements

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Table 1. Percentages of teachers' responses on child behaviour in each category ("not true", "somewhat true" and "certainly true") by gender on each of the 25 Strengths and Difficulties Questionnaire (SDQ) items and p-value for the gender difference. Results of 1187 school children aged seven to nine years in Kinshasa, Africa.

The 25 SDQ items arranged by the 5 scales	Male			Female			
	NT[a] (%)	ST[b] (%)	CT[c] (%)	NT[a] (%)	ST[b] (%)	CT[c] (%)	p-value
Hyperactivity-inatt. items							
Agitated	40	30	30	55	25	20	0.000*
Restless	57	31	12	57	34	09	0.1
Distract	34	38	27	42	34	24	0.023*
Think	32	50	18	37	45	18	0.2
Attention	36	46	18	41	38	21	0.023*
Conduct problems items							
Angry	47	36	16	62	26	12	0.000*
Obedient	68	28	04	71	25	04	0.4
Fight	55	28	16	71	18	11	0.000*
Lie	66	22	12	76	17	06	0.000*
Steal	89	09	02	94	05	01	0.007*
Emotional symptoms items							
Ache	60	31	09	68	25	07	0.023*
Anxious	58	33	10	60	30	10	0.6
Unhappy	69	24	07	72	20	09	0.2
Cling	49	40	11	52	39	09	0.3
Afraid	54	30	16	58	30	12	0.1
Peer problems items							
Alone	66	25	09	69	22	09	0.4
Friend	64	31	05	71	23	07	0.007*
Liked	48	48	04	56	38	06	0.001*
Troubled	53	33	14	60	31	09	0.009*
Agree	39	43	18	37	44	19	0.8
Prosocial items							
Sensible	12	46	42	15	42	43	0.2
Share	15	47	38	12	44	44	0.68
Help	14	50	36	13	45	41	0.9
Kind	06	46	48	05	40	54	0.06
Helpful	13	48	39	11	42	47	0.013*

[a]: Not true; [b]: Somewhat true; [c]: Certainly true;
* p-value significant at <0.05

Table 2. Principal components factor analysis of the 25 items of the Strengths and Difficulties Questionnaire (SDQ*) for the 1187 school children, seven to nine years of age, with complete data sets according to teachers. Only factors above 0.40 are reported.

SDQ items	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Hyperactivity					
Agitated					0.68
Restless					0.70
Distract		0.63			
Think		0.81			
Attention		0.79			
Conduct					
Angry					0.56
Obedient	-0.49				
Fights				0.61	0.49
Lies				0.58	
Steals				0.68	
Emotional					
Ache			0.42		
Anxious			0.72		
Unhappy			0.63		
Cling		0.44	0.48		
Afraid			0.67		
Peer					
Alone			0.59		
Friend	-0.66				
Liked	-0.69				
Troubled				0.49	
Agree					
Prosocial					
Sensible	0.47	-0.56			
Share	0.75				
Help	0.75				
Kind	0.73				
Helpful	0.72				

* www.sdqinfo.com

Table 3. Mean scores for the five SDQ scales for boys (502) and girls (685), seven to nine years of age, as reported by teachers. The cut-off scores in the population using the 90th percentiles (10th percentile for prosocial scale) and the cut-off scores for boys and girls, and the French-British cut-offs are listed.

| **SDQ scales**	Boys mean (SD)	Girls mean (SD)	95% CI difference of the mean	Cronbach coefficient (α)	Congolese cut-off			French-British cut-off
					Boys	Girls	overall	overall
Hyperactivity	4.0 (2.4)	3.6 (2.4)	0.5 (0.2 to 0.8)*	0.66	7	7	7	7
Conduct	2.2 (2.1)	1.6 (1.8)	0.6 (0.4 to 0.9)*	0.64	5	4	5	4
Emotional	2.6 (2.2)	2.4 (2.2)	0.3 (0.0 to 0.5)*	0.71	6	5	6	6
Peer	2.8 (1.7)	2.5 (1.7)	0.2 (0.0 to 0.4)*	0.35	5	5	5	5
Prosocial	6.4 (2.5)	6.7 (2.5)	-0.3 (-0.6 to 0.03)*	0.80	3	3	3	4
Total Difficulties Score	11.7 (6.3)	10.1 (6.0)	1.6 (0.9 to 2.3)*	0.81	21	18	19	16

* p-value <0.05.

Table 4. The proportions of pupils with abnormal Total Difficulties Score (TDS[a]) defined according to the 90th percentile cut-off scores among the 1187 school children seven to nine years of age as reported by the teachers. The unadjusted and adjusted odds ratios (OR) with 95% confidence interval (CI) for abnormal scoring pupils on the TDS in relation to gender, high socioeconomic status, very good nutrition, and absence of illness is listed.

Variables	Total N (%)	Abnormal TDS[a] N (%)	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Gender				
Girls	685 (58)	128 (19)	1	1
Boys	502 (42)	139 (28)	1.2 (0.9 to 1.8)	1.4 (0.9 to 2.0)
Socioeconomic status				
High	75 (6)	8 (11)	1	1
Middle	1009 (85)	103 (10)	0.9 (0.4 to 2.0)	0.9 (0.4 to 2.1)
Low	103 (9)	25 (24)	2.1 (1.1 to 6.3)*	2.1 (0.8 to 5.5)
Nutritional status				
Very good	472 (40)	50 (11)	1	1
Good	678 (57)	75 (11)	1.0 (0.7 to 1.5)	0.9 (0.6 to 1.5)
Poor	37 (3)	11 (30)	3.6 (1.7 to 7.7)*	1.8 (0.7 to 4.6)
Illness				
No	976 (82)	93 (9)	1	1
Don't know	154 (13)	28 (18)	2.1 (1.3 to 3.3)*	2.0 (1.3 to 3.3)*
Yes	57 (5)	15 (26)	3.4 (1.8 to 6.3)*	3.0 (1.6 to 5.8)*

[a]TDS: total difficulties score on the Strengths and Difficulties Questionnaires by Goodman (www.sdqinfo.com); * p-value < 0.05.

Figure 1. Map of Kinshasa showing the two sectors with the selected and studied schools

Congo river

S+

S

S+

S

S+

S

S

S

S+

S+

S+

S+

S+

Kinshasa East

S

S

S

S+

S

S+

S

S+

0 1 2 3 4 5
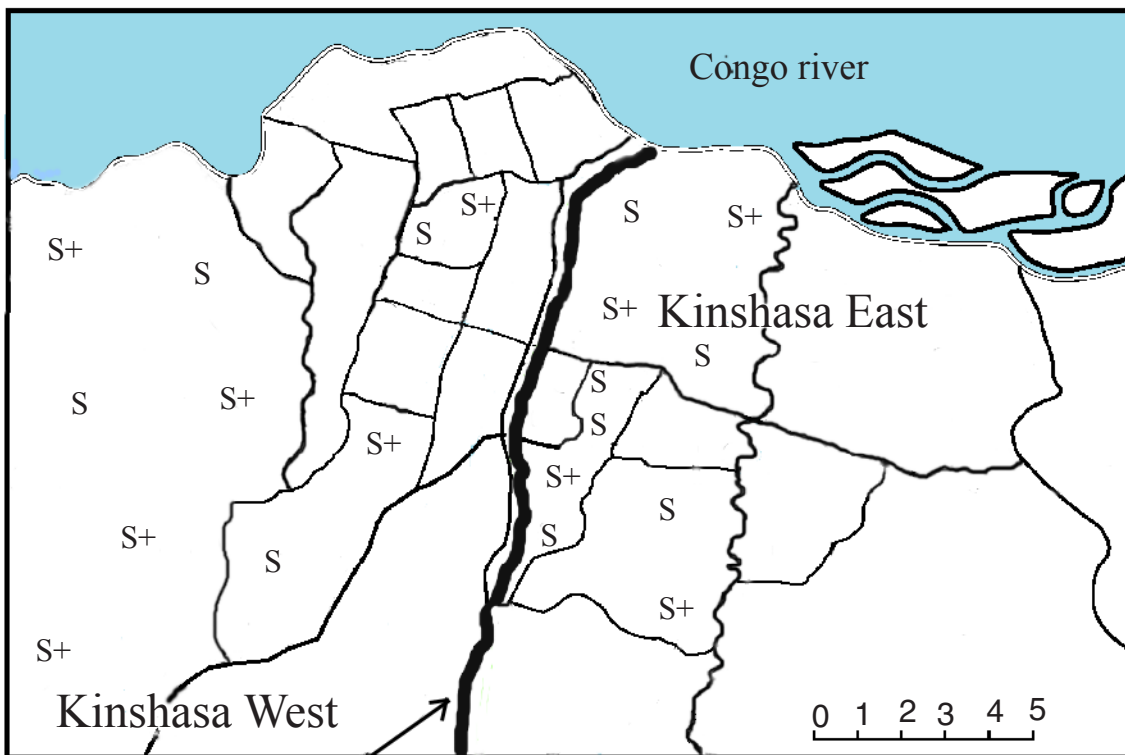
Kinshasa West

Border between Kinshasa West and East

S: selected schools
S+: selected and studied schools