

Assessments of the physiological Parameters among fish handlers in the two Fishing Communities of the Gambia

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GSC Advanced Research and Reviews, 2025, 22(03), 214-224

Publication history: Received on 02 February 2025; revised on 12 March 2025 accepted on 14 March 2025

Article DOI: <https://doi.org/10.30574/gscarr.2025.22.3.0074>

Abstract

Introduction: Fish handlers are exposed to a variety of physiological problems due to the stressful nature of their jobs. The study aimed to assess the physiological parameters prevalent among fish handlers in the Gambia.

Methods: A two-stage random sampling design was used and Tanji and Banjul fishing communities were purposively selected, followed by a selection of 231 Fish handlers. Physiological parameters such as body mass index (BMI), waist circumference, hip circumference, and blood pressure measurements were taken from the respondents. Data were analyzed using the Statistical Package for Social Sciences (SPSS 20.0). Descriptive statistics were used to summarize the data.

Results: The mean body mass index of fish handlers was 23.9 ± 4.8 and 23.2 ± 4.1 in Tanji and Banjul respectively. The comparison of mean BMI between Tanji and Banjul was not significant. The mean waist circumference and waist Hip ratio were within the normal range for both males and females in Tanji and Banjul (85.9, 86.9) and (0.88, 0.87). Chi-square analysis revealed that mean body mass index, waist circumference, hip circumference, and waist-hip ratio were not significant in Tanji and Banjul. The mean Systolic and Diastolic blood pressure were 135.7 ± 20.3 and 85.4 ± 13.0 in Tanji and 129.0 ± 14.6 and 79.4 ± 12.5 in Banjul. Several respondents in Tanji and Banjul had pre-hypertensive systolic blood pressure. However, a comparison of the mean blood pressure between Tanji and Banjul was significant.

Conclusion: As a result of the stressful nature of their job and their work durations, fish handlers are exposed to a lot of physiological issues, hence there is a need for them to be sensitized to the various hazards associated with their various activities.

Keywords: Physiological parameters; Assessment; Fish handlers; Fishing communities; The Gambia

1. Introduction

Several research studies have used self-rated health and physiological markers to measure the health status of individuals. Though the health status of fish processors is likely to be affected due to the nature of their job, research is limited in the use of both self-rated health and physiological markers to measure their health status in a single study (1). Some of the physiological parameters measured in this research were:

High Blood Pressure (Hypertension). Hypertension is one of the most common health concerns worldwide, and it is linked to an increased risk of cardiovascular disease. Hypertension affects roughly 330 million people in affluent countries and 640 million in poor countries (2). According to the World Health Organization, hypertension is one of the

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most preventable causes of mortality worldwide. It is anticipated that 1.56 billion persons will have elevated blood pressure by 2025. According to the WHO, hypertension is an important modifiable risk factor that accounts for 4.5 percent of the global disease burden and is linked to a 40% decrease in stroke risk and a 15% reduction in myocardial infarction when managed properly (3).

Fish handlers work for lengthy periods and are subject to a variety of stressful situations. They also have a lower socioeconomic standing, and their lack of literacy harms their overall health. (4). Fishing is a hazardous occupation and fish handlers are predisposed to a variety of health-related morbidities especially non-communicable diseases due to the demanding and hard nature of their work. According to several studies conducted around the world, the prevalence of hypertension in fishermen ranges from 4 percent to 45 percent. Dulskiene *et al.*, (5) discovered that 44.9 percent of Lithuanian fishermen have high blood pressure. Mudgal *et al.*, (6) found a 4.4 percent prevalence of hypertension among fishermen in Mangalore's coastal area. Hypertension and associated risk variables among fishermen from the Chennai district: a cross-sectional study in India revealed: "the prevalence of hypertension to be 46.6%. The average blood pressure values were 127 and 84 mmHg, respectively" (7).

In a similar study by Begossi *et al.*, (8), Ponta Grossa (71 percent, out of 14) was shown to have a greater prevalence of hypertension than Copacabana (where the rate was lower) (11 percent, out of 18). This may be related to the conventional method of salting and drying fish before the invention of electricity. This method causes fisherman to consume more salt during their careers, which is evidenced in the community's present health problems in Ponta Grossa, Paraty. A study was done by Dominic *et al.*, (1) on the Determination of Health Status Using Self-Rated Health and Physiological Markers of Fisherfolks in the Central Region of Ghana, showed that 170 participants were in the pre-hypertension range (120 and 139), of which 69.4% were males and 30.6% females. Besides, 25.8% were hypertensive (140-159), involving 73.1% were males and 26.9% (25) females, with an additional 10.5% at stage two hypertension (≥ 160). A study in India revealed that Pre-hypertension was recorded in 47.11% of the patients, while 31.11% of the subjects had hypertension and normal blood pressure was recorded in 30.6% of the subjects. 16 percent of those with hypertension had recent detections. (9).

Another important physiological parameter of fish handlers assessed in this research was the nutritional Status of the Fishing Community. According to Patil (10), malnutrition is also another problem faced by the fishing communities. Subrat Kumar Pradhan (11) in his study revealed that the prevalence of malnutrition was 57.2% ranging from various grades. Also, Proceedings (12), in his study indicated that 67.5% of fish handlers were malnourished. Stunting among the under-five years' age-group community was 44.1% (13).

The findings by (12) revealed that several (69.2%) of women had iron deficiency anemia. Angular stomatitis, cheilosis, bleeding gums, and skin dryness were among the other clinical signs that varied from 25% to 30% Generally, several women (48%) were discovered to have nutritional deficiency diseases (13).

Hansen *et al.*, (14) stated that being overweight puts one at danger for hypertension, diabetes, and stroke. Gopal *et al.*, (7) conducted a study in which they found that Overweight and obesity were found to be prevalent in 15.99 percent and 38.73 percent of the fisherman population. The mean BMI was 24 (4.38) kg/m² due to their food habits. Concerning diet, fruits and vegetable consumption among the fishermen were very poor. According to Pougnet *et al.*, (15), 60.9 percent of people are overweight. Obesity has emerged as a major public health concern. Obesity was reported to be prevalent in four provinces of Sri Lanka, with a frequency of 20.3%. (16). According to a survey conducted in Denmark, 73.6 percent of fishermen are overweight (14). Dominic *et al.*, (1) in his study on the Determination of Health Status Using Self-Rated Health and Physiological Markers of Fisherfolks in the Central Region of Ghana, revealed that 67.2% of males and 29.1% of females were in the normal weight category and about 15.8% were either overweight or obese, with more females (71.9%) than males (28.1%). The waist/hip ratio had the highest percentage of aberrant values when the other obesity measurements were taken into account, at 66.6%. When the waist circumference was measured alone, 52.44% were above average. According to BMI estimations, 37.33% of people were overweight or obese, and 24% had abnormally high levels of total cholesterol. (9). Anthropometric parameters measured among fisherwomen showed a mean weight of 48.5kg and a height of 150cm. The average body mass index (BMI) was 21.3. Women were normal in 49% of cases, undernourished in 17%, slightly nourished in 10.5 percent, highly malnourished in 4%, and severely malnourished in 2.9 percent of cases. Only 11.5 percent of the population was overweight, and only 4.6 percent were obese. The average weight of schoolchildren was discovered to be 12.7 kg. The bulk of the children (41%) were in the grade-1 category of malnutrition, 32% in normal grades, 19% in the grade-2 category of malnutrition, and the rest in the grade-3 category of malnutrition respectively (12).

2. Methods

2.1. Study Area

The Gambia is a country in West Africa that is largely surrounded by Senegal, with a small stretch of coastline that runs along the Atlantic Ocean on its western end. The Gambia is located on both sides of the Gambia River, which runs through the country's center and drains into the Atlantic Ocean. Its area is 11,300 square kilometers with a population of 2,321,123 million according to the World Population Prospects (17). Banjul is the capital of Gambia, and Serekunda and Brikama are the two major cities.

The research was conducted in Tanji which is a *town* in The Gambia, along the Atlantic coast and is the most populated district in the Local Gambia Authority (with 14,531 inhabitants based on the 2013 Census. Tanji Village (also known as Tanjeh or Tanje) is located on the Atlantic Ocean beach in the northern section of the Kombo South District, West Coast Region of The Gambia. It is also known as the Tanji Fishing Village. Tanji lies 30 kilometers from Banjul, the capital city, and 12 kilometers southwest of Kololi resort, on the Kombo Coastal Road.

Banjul, which is the capital city of the Gambia was originally called Bathurst and has a population of 31,301. However, the population of the Greater Banjul Area, which includes the City of Banjul and the Kanifing Municipal Council, is estimated to be 413,397 people (according to the 2013 census).

2.2. Study Design

A cross-sectional study was conducted. Data was collected among fish handlers (both male and female) in the selected communities. One hundred and fifty-four respondents were randomly selected from Tanji and seventy-seven from Banjul

2.3. Data Collection Methods

A semi-structured interviewer-administered questionnaire was used to collect data on the sociodemographic information of the respondents. Research assistants were trained to collect the data from selected fish handlers within the community through interviews. The interview was conducted in Mandinka, Serere, and Wolof as these are the major languages of the fish handlers in the study site. The data collection was supervised by the researcher.

Before the commencement of the questionnaire administration, permission was first sought from the two fishing community leaders and then from the leaders of each of the fish handlers (fishermen, fish smokers, fish dryers, and fish traders). These group leaders helped to mobilize their members.

A sphygmomanometer was used to check the blood pressure of the respondents. Anthropometric parameters such as weight, height, waist, and hip circumference were measured to determine the nutritional status of the respondents using a weighing scale, stadiometer, and measuring tape. These measurements were done by experienced nursing officers

2.4. Data Analysis

A survey questionnaire was cross-checked to ensure they were properly filled and accurate. Data were analyzed using SPSS software version 22 and Stata13.0. Descriptive statistics were used to summarize the data. The t-test was used to compare the mean values of the parameters among the two communities.

3. Results

3.1. Sociodemographic Information of the Respondents

The mean age of the fish handlers was 34.2 ± 10.7 years in Tanji and 35.86 ± 10.86 years in Banjul. The majority, 75.3%, and 92.2% were male in the Tanji and Banjul respectively, 64.9% (Tanji) and 71.4% (Banjul) were married. Several respondents 36.4% (Tanji) and 42.9% (Banjul) reported that they eat most time,. More than half, 58.4% in Tanji and 63.6% in Banjul started the activity within the age range of 13-24 years, 70.8% (Tanji) and 51.9% (Banjul) spent about 9 to 16 hours a day at work.

Table 1 Socio-Demographic Features of the Fish Handlers (N=231)

Demographic Characteristics	Baseline (N=231)		Statistical test	P-Value
	Tanji (n=154) No. (%)	Banjul (n=77) No. (%)		
Age Group				
≤ 24	31(20.1)	13 (16.9)		
25-42	91(59.1)	47 (61.0)	χ ²	0.836
43-66	32(20.8)	17(22.1)		
Mean age	34.2±10.7	35.8±10.8		
Sex				
Male	116(75.1)	71(92.2)	χ ²	0.002*
Female	38(24.7)	6(7.8)		
Single	50(32.5)	22(28.6)		
Married	100(64.9)	55(71.4)		
Widow	4(2.6)	0(0.0)	†	0.352
Status				
Fishermen	87(56.5)	62(80.5)		
Fish dryers	9(5.8)	2(2.6)		
Fish smokers	43(27.9)	9 (11.7)		
Fish traders	15(9.7)	4(5.2)	†	0.004*
Ethnicity				
Mandinka	57(37.0)	17(22.1)		
Fula	15(9.7)	8(10.4)	†	0.011*
Wollof	41(26.6)	29(37.7)		
Jola	13(8.4)	1(1.3)		
Serere	28(18.2)	22(28.6)		
Educational Status				
Primary	50(32.5)	10(13.0)		
Secondary	39(25.3)	27(35.1)	χ ²	0.013*
Tertiary	17(11.0)	13(16.9)		
Madarasa	48(31.2)	27(35.1)		
Feeding Status while working				
Always	37(24.0)	16(20.8)		
Most times	56(36.4)	33(42.9)	†	0.095
Sometimes	60(39.0)	24(31.2)		
Never	1(0.6)	4(5.2)		
Hours Spend during activity				

≤ 8	34(22.1)	28(36.4)		
9-16	109(70.8)	40(51.9)	χ^2	*0.019
17-24	11(7.1)	9(11.7)		
Age at which the activity Started				
≤24	90(58.4)	49(63.6)		
25-42	59(38.3)	16(20.8)	χ^2	0.000*
43-60	5(3.2)	12(15.6)		

* =Statistical significance at $p < 0.05$ †Fisher's exact test χ^2 = Pearson chi-square

3.2 Physiological Parameters

Physiological parameters such as body mass index (BMI), waist circumference, hip circumference, and blood pressure measurements were taken from the respondents in Tanji and Banjul communities.

For BMI, the majority of the respondents in the two study communities were within the healthy weight range. 85 (54%) and 48 (62%) Table 2

Cross-tabulation of the feeding status of the respondents against their body mass index revealed no significant relationship between the feeding status of the respondents and their BMI($p > 0.05$) (Table 3).

The mean waist and hip circumferences for Tanji are higher than Banjul's (86.9, 85.9) and(99.9, 98.1). However, the mean w/h ratio for Tanji and Banjul is almost the same. Table 4

Table 5 shows the blood pressure readings from the respondents in Tanji and Banjul. Only 32(21%) and 21(27%) respondents had normal systolic blood pressure. There was a significant relationship between the systolic blood pressure results of Tanji and Banjul ($p = 0.010$, 95% CI). Also, 48(31%) and 39(51%) of the respondents in Tanji and Banjul respectively had normal diastolic blood pressure. There was a significant relationship between the diastolic blood pressure of Tanji and Banjul ($p = 0.008$).

Cross-tabulation of BMI against blood pressure revealed no significant relationship between the body mass index of the respondents and their blood pressure ($p > 0.05$). Table 6

Also, cross-tabulation of hours spent at work by the respondents against their blood pressure revealed no significant relationship between the length of time spent at work and the blood pressure of the respondents ($p > 0.05$) (Table 7).

3.3. Body Mass Index

Table 2 Body mass index of the Respondents in Tanji and Banjul

Variables	Tanji(n=154) No(%)	Banjul(n=77) No(%)	Chi-square	P-value
Underweight	14(9%)	8(10%)		
Healthy weight	83(54%)	48(62%)	-	0.413 ^b
Overweight	40(26%)	17(22%)		
Obese	17(11%)	4(5%)		
Mean / Std.Dev	23.91±4.83	23.20±4.14		
95%conf.interval				
Lower limit	23.14	22.26		
Upper limit	24.68	24.14		
t-value	-1.10			
Deg of freedom	229			

Table 3 Cross tabulation of feeding status of the respondents against their body mass index

Variables	Tanji (154) Al No(%)	MT No(%)	ST No(%)	N No(%)	Banjul(77) Al No(%)	MT No(%)	ST No(%)	N No(%)
Underweight	3(21%)	3(21%)	8(57%)	0(0%)	4(50%)	2(25%)	2(25%)	0(0%)
Healthy weight	22(27%)	33(40%)	27(33%)	1(1%)	27(56%)	1(33%)	4(8%)	1(2%)
Overweight	8(20%)	16(40%)	16(40%)	0(0%)	8(47%)	6(35%)	3(18%)	0(0%)
Obese	4(24%)	4(24%)	9(53%)	0(0%)	2(50%)	1(25%)	0(0%)	1(25%)
Chi-Square	-				-			
P-Value	0.643 ^b				0.502 ^b			
Remark	Not significant				Not significant			

AL=always, MT=most times, ST=sometimes, N=never

3.4. Waist Circumference, Hip circumference and Waist/Hip ratio

Table 4 Two sample t test with equal variable for WC,HC and W/H ratio by location

Variables	Category	Statistics		Bootstrap ^a		
				Std. Error	95% Confidence Interval	
					Lower	Upper
Waist C	Banjul	Mean	85.90909	1.071947	83.77412	88.04406
		Std. Deviation	9.406299			
	Tanji	Mean	86.92208	0.8731405	85.19711	88.64705
		Std. Deviation	10.83539			
Hip C	Banjul	Mean	98.05195	1.264275	95.53393	100.57
		Std. Deviation	11.09397			
	Tanji	Mean	99.91558	0.8286705	98.27847	101.5527
		Std. Deviation	10.28353			
W/H ratio	Banjul	Mean	0.8780638	0.0067982	0.864524	0.8916036
		Std. Deviation	0.059654			
	Tanji	Mean	0.8705502	0.0055903	0.8595061	0.8815942
		Std. Deviation	0.693733			

3.5. Blood Pressure Assessment

Table 5 Blood pressure results of the respondents in Tanji and Banjul

Variables	Tanji(N=154) N0(%)	Banjul(N=77) N0(%)	Chi-square	P-value
Systolic				
Normal	32(21%)	21(27%)		
Prehypertension	68(44%)	39(51%)	-	*0.0104 ^b
Stage1hytension	37(24%)	15(19%)		
Stage2hypertension	17(11%)	2(3%)		
Mean /std.dev	135.7±20.28	129±14.6		
95%conf.interval				
Lower limit	132.47	125.68		
Upper limit	138.94	132.32		
t-value	-2.59			
Deg of freedom	229			
Diastolic				
Normal	48(31%)	39(51%)		
Prehypertension	49(32%)	25(32%)	-	*0.0008 ^b
Stage1hypertension	36(23%)	9(12%)		
Stage2hypertension	21(14%)	4(5%)		
Mean/std.dev	85.4±13.0	79.4±12.5		
95%conf.interval				
Lower limit	83.33	76.52		
Upper limit	87.47	82.18		
t-value	-3.38			
Deg of freedom	229			

Table 6 Cross tabulation of body mass index with Blood pressure

Variables BMI	Tanji(n=154) Normal No(%)	Hypertensive No(%)	Banji(n=77) Normal No(%)	Hypertensive No(%)
Systolic Blood pressure				
Underweight	10(71%)	4(29%)	6(75%)	2(25%)
Healthy weight	56(67%)	27(33%)	40(83%)	8(17%)
Overweight	26(65%)	14(35%)	12(71%)	5(29%)
Obese	8(47%)	9(53%)	2(50%)	2(50%)
Chi-Square	-		-	
P-value	0.428 ^b		0.283 ^b	
Remark	Not significant		Not significant	
Diastolic Blood Pressure				
Underweight	5(36%)	9(64%)	5(63%)	3(37%)
Healthy weight	25(30%)	58(70%)	26(54%)	22(46%)
Overweight	16(40%)	24(60%)	6(35%)	11(65%)
Obese	2(12%)	15(88%)	2(50%)	2(50%)
Chi-Square	-		-	
P-value	0.191 ^b		0.495 ^b	
Remark	Not significant		Not significant	

Table 7 Cross tabulation of hours spent at work by the respondents against their blood pressure

Variables	Tanji(n=154) Normal No(%)	Hypertensive No(%)	Banjul(n=77) Normal No(%)	Hypertensive No(%)
Systolic Blood pressure				
Working hours				
≤8	23(82%)	5(18%)	23(68%)	11(32%)
9-16	31(78%)	9(22%)	71(65%)	38(35%)
17-24	6(67%)	3(33%)	6(55%)	5(45%)
Chi-square	-		0.633	
P-value	0.629		0.729 ^a	
Diastolic Blood pressure				
Working hours				
≤8	13(38%)	21(62%)	13(46%)	15(54%)
9-16	32(29%)	77(71%)	22(55%)	18(45%)
17-24	3(27%)	8(73%)	4(44%)	5(56%)
Chi-square	-		-	
P-Value	0.614 ^b		0.761 ^b	
Remark	Not significant		Not significant	

4. Discussion

Physiological parameters such as body mass index (BMI), waist circumference, hip circumference, and blood pressure measurements were taken from the respondents in Tanji and Banjul communities.

According to Hansen *et al.*, (14), being overweight is now recognized as a health issue since it is a risk factor for certain chronic diseases. More than half 53.9% Tanji and 62.3% in Banjul had BMI within the healthy range and 26.0% in Tanji and 22.1% in Banjul were overweight.

The mean body mass index of fish handlers was 23.9 ± 4.8 and 23.2 ± 4.1 in Tanji and Banjul respectively. The comparison of mean BMI between Tanji and Banjul was not significant.

This is consistent with research by Dominic *et al.*, (1) on the Determination of Health Status Using Self-Rated Health and Physiological Markers of Fisherfolks in the Central Region of Ghana which revealed that 67.2% of males and 29.1% of females were in the normal weight category. A total of 15.8% were either overweight or obese, with more females (71.9%) than males (28.1%). This is in contrast with the research results by Hansen *et al.*, (14) which showed a high prevalence of overweight among the fishermen. Pougnet *et al.*, (15) reported a lower prevalence of 60.9%. This aligns with research results by (7) which showed that the prevalence of overweight and obesity in the fishermen population was 15.99% and 38.73%, respectively.

The study by (10) in India, revealed that the Anthropometric parameters measures among fisherwomen showed that their average weight was 48.5 kilograms, their height was 150 centimeters, and their BMI was 21.3. Forty- nine percent of women were healthy, 17 percent were underweight, 10.5 percent were undernourished, 4% were moderately malnourished, and 2.9 percent were severely malnourished. Only 11.5 percent of the population was overweight, and only 4.6 percent were obese.

The mean waist circumference and waist Hip ratio were within the normal range for both males and females in Tanji and Banjul (85.9 -86.9) and (0.88-0.87). Chi-square analysis revealed that mean body mass index, waist circumference, hip circumference, and waist-hip ratio were not significant in Tanji and Banjul.

This contradicts a cross-sectional survey conducted by Seenivasan *et al.*, (9) which found that the most aberrant results were found in the waist/hip ratio (66.6%), which was the highest. When the waist circumference was measured alone, 52.44% of the measurements were above average. According to BMI estimations, 37.33% of people were overweight or obese, or above the usual range, while 24% had abnormal total cholesterol readings..

Fishing is a hazardous occupation. Fish handlers have prolonged hours of continuous work which puts them under lots of stress, making them vulnerable to many health problems, especially non-communicable diseases. Several respondents in Tanji and Banjul had pre-hypertensive systolic blood pressure (44.2% and 51.0%). Very few, 20.8% in Tanji and 27.3% in Banjul had normal systolic blood pressure. About 50.6% of the respondents in Banjul had normal diastolic blood pressure. Very few, 31.8% in Tanji and 32.5% in Banjul had pre-hypertensive diastolic blood pressure. The mean systolic and Diastolic blood pressure were 135.7 ± 20.3 and 85.4 ± 13.0 in Tanji and 129.0 ± 14.6 and 79.4 ± 12.5 in Banjul. However, a comparison of the blood pressure between Tanji and Banjul was significant. Cross-tabulation of hours spent at work by the respondents against their blood pressure was insignificant in Tanji and Banjul. This is similar to the finding from a cross-sectional study of hypertension and its risk factors in fishermen of the Chennai district of India which revealed a prevalence of 46.6% for hypertension. The average blood pressure values were 127 and 84 mmHg respectively (7).

According to research by several authors, 44.9% of Lithuanian fishermen had elevated blood pressure (5). A similar study was done by Dominic *et al.*, (1) on the Determination of Health Status Using Self-Rated Health and Physiological Markers of Fisherfolks in the Central Region of Ghana, showed that 170 participants recorded pre-hypertension (120 and 139), of which 69.4% were males and 30.6% females. Besides, 25.8% were hypertensive (140-159), involving 73.1% males and 26.9% (25) females, with an additional 10.5% at stage two hypertension (≥ 160). Also, a study on Blood Pressure among Coastal fishermen in Southeast Brazil by (8) showed that Ponta Grossa has a greater prevalence of hypertension than Copacabana and this may be related to the conventional method of salting and drying fish before the invention of electricity. The reason could also be similar in the study communities because most fish handlers especially fish dryers apply salt to the fish before drying

5. Conclusion

This study revealed that most of the fish handlers in the two study communities had. pre-hypertensive systolic blood pressure which could be attributed to the prolonged hours of continuous work which puts them under lots of stress. Therefore, education should be carried out among the fish handlers especially the younger generation to reduce hypertension and other disease conditions associated with their jobs. Also, they should be encouraged, to eat more fruits and vegetables, increase physical activity, and regularly go for medical checkups.

Compliance with ethical standards

Acknowledgments

The authors acknowledged the staff of the Tanji and Banjul fishing communities for their immense support during this research. The authors also feel grateful to all the participants and data collectors for their support and cooperation We also acknowledge Mr Mansour Badjie for his assistance in data analysis.

Disclosure of conflict of interest

The authors have no competing interests.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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