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Assessment of knowledge, attitudes and practices related to water, hygiene and sanitation (WASH) in rural areas: Case Study of Tibiri Commune, Dosso Region, southwest Niger

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Abstract

Access to essential water, sanitation, and hygiene (WASH) services remains a major challenge in rural areas of Niger. This contributes to the prevalence of waterborne diseases, thereby justifying the need for close monitoring of Sustainable Development Goal 6 (SDG 6), which focuses on universal access to safe drinking water, sanitation, and the sustainable management of water resources. This study assessed the knowledge, attitudes, and practices (KAP) of vulnerable households in the commune of Tibiri, Dosso region. A cross-sectional survey was conducted among 200 randomly selected households across four villages, using a structured questionnaire administered via KoboCollect.

Findings reveal a low level of knowledge (43%), generally positive attitudes (64%), and insufficient practices (43%). Despite partial understanding of some essential WASH interventions, risky behaviors persist, such as limited household water treatment, irregular latrine maintenance, and low use of soap for handwashing.

These results highlight the need to promote integrated WASH approaches that combine improved access to safe drinking water, provision of adequate sanitation facilities, active promotion of hygiene practices, and strengthened community participation, in order to sustainably reduce the risks of waterborne diseases in similar rural contexts.

Keywords: WASH; Knowledge; Attitudes; Practices; Rural communities; Niger

1. Introduction

Unsafe water, inadequate sanitation, and poor hygiene remain at the heart of global health challenges, despite numerous initiatives and investments. It is estimated that around 2 billion people lack access to safe drinking water, 3.5 billion do not have basic sanitation, and 2.3 billion are deprived of basic hygiene facilities. Moreover, only 45% of countries are on track to achieve SDG target 6.1.1 (access to safe drinking water), and just 25% are on track for SDG target 6.2.1 (access to sanitation) [1].

Although SDG 6 is clearly defined with ambitious targets, progress remains slow, particularly in Sub-Saharan Africa, highlighting the need for close monitoring to inform policymakers and key stakeholders in the design of policies and recovery strategies [2].

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Niger, a Sahelian country in Sub-Saharan Africa, illustrates this concerning dynamic in the WASH (Water, Sanitation, and Hygiene) sector. Challenges are exacerbated by humanitarian, security, and climate crises, especially in rural areas where about 84% of the population resides. Household access to basic drinking water services is estimated at 49.93%, open defecation affects 70.4% of the population, and 66.4% rely on inappropriate handwashing facilities [3][4].

Poor WASH conditions have severe consequences for community health, contributing to diseases such as acute diarrhea, trachoma, cholera, typhoid and paratyphoid fevers, as well as hepatitis A and E [5][6]. Globally, improving WASH services could prevent up to 9% of the global disease burden and reduce 6.3% of all deaths [7][8]. Among children, inadequate WASH services significantly increase the risks of malnutrition, stunting, and diarrheal-related deaths, which account for 90% of such cases [9][10][11].

Although communities generally claim to be aware of and practice good WASH behaviors, evidence shows a significant gap between knowledge and actual practices [12]. For this reason, WASH improvement policies and strategies now place knowledge, attitudes, and practices (KAP) change at the core of their approaches [13].

KAP studies, which analyze the knowledge, attitudes, and practices of communities, are essential tools to identify strengths and gaps, and to refine communication and behavior-change strategies [14].

In this context, the present study was conducted in the commune of Tibiri, Niger, where improving water, sanitation, and hygiene conditions is a social priority. It focused on four target villages, with the ambition of providing policymakers with concrete evidence to guide interventions and strengthen community resilience.

2. Materials and methods

2.1. Study Area

The study was conducted in the rural commune of Tibiri, located in the Doutchi Department, Dosso region, Republic of Niger. This area, covering 469.25 km^2, is geographically situated at 13°6'33'' North latitude and 4°00'02'' East longitude, and is composed of 165 localities (Figure 1). It has a population of 77,558 inhabitants, of whom 49.85% are women and 80.82% are under the age of 35. The mortality rate stands at 80‰ overall, and 75‰ among children. The commune is also characterized by insufficient water supply and sanitation infrastructure [15][16].

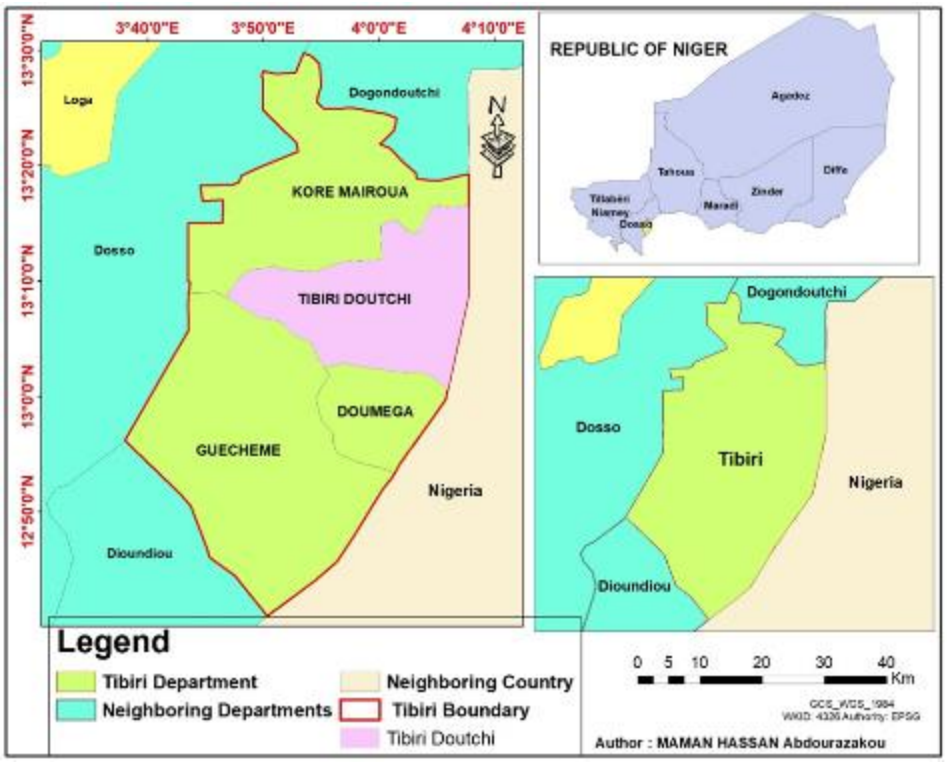

Figure 1 Location of the Study area

2.2. Study Design, Setting, and Sampling

The study adopted a quantitative cross-sectional design to assess the knowledge, attitudes, and practices (KAP) of vulnerable communities in Tibiri regarding WASH.

For that, a structured questionnaire was developed to capture the three dimensions of the study (knowledge, attitudes, and practices). The tool was administered at the household level by trained enumerators.

The survey was conducted in the rural commune of Tibiri, located in the Doutchi Department, Dosso region, Niger. Four villages were purposively selected due to their high prevalence of waterborne diseases and similarity to the broader study area: Kadidi, Kolloguigui, Toudoun Moré, and Maskaoussa Tounga Sandi.

In each village, a list of 100 poor and ultra-poor households was established using the Household Economy Approach (HEA) method [17], giving a total frame of 400 households.

The sample size was determined using Slovin's formula:

$$n = \frac{N}{(1 + Ne^2)}$$

Where N = 400 households and e = 0.05 (margin of error).

This yielded a final sample size of 200 households, with the household serving as the unit of analysis.

2.3. Data collection and analysis

The questionnaire was digitized using KoboCollect and deployed on tablets for field data collection. Data were synchronized to a server, cleaned, and analyzed in SPSS. Descriptive statistics (frequencies, percentages, means) were computed, and where relevant, associations between variables were assessed using appropriate statistical tests.

For the interpretation of data from this KAP study, knowledge, attitudes, and practices were categorized according to modified Bloom's cut-off points (≥80% = good, 60–79% = moderate, <60% = poor), thereby facilitating comparison with similar studies [18].

2.4. Ethical Considerations

Prior to data collection, informed consent was obtained from all participants. Participation was voluntary, and confidentiality and anonymity of respondents were strictly maintained throughout the study.

3. Results and discussion

3.1. Socio-Demographic Characteristics of the Sample

The socio-demographic characteristics of the population involved in this study are presented in Table 1.

Table 1 Sociodemographic characteristics of participants in Tibiri (*n*=200)

Demographic characteristics	Categorie	N	%
Age of participants in years	18–24	23	11,50%
	25–34	33	16,50%
	35–44	70	35,00%
	45–54	35	17,50%
	55–64	26	13,00%
	65+	13	6,50%

	Total	200	100%
Sex of participants	Female	108	54,00%
	Male	92	46,00%
	Total	200	100%
Educational attainment	Literacy	77	38,50%
	Quranic school	76	38,00%
	Primary	27	13,50%
	Secondary	19	9,50%
	Higher education	1	0,50%
	Total	200	100%
Household size			
	1–4	33	16,5 %
	5–8	79	39,5 %
	9+	88	44 %
	Total	200	100 %

The socio-demographic characteristics of the sample reveal that 54% of respondents were female, with an average age of around 42 years (Table 1). 38.5% had no formal education, and 38% had only attended Quranic school (Table 1).

Additionally, household size was relatively large, with more than 9 persons per household in 44% of cases (Table 1).

These findings suggest that the low educational level of the communities, combined with large household sizes, may limit households' ability to adopt safe WASH practices and simultaneously place pressure on water resources, sanitation infrastructure, and hygiene behaviors. This underscores the need to contextualize WASH communication and awareness messages in rural areas, particularly through visual and practical messaging, as recommended by similar studies [19][20][21].

3.2. Knowledge, Attitudes, and Practices (KAP) of WASH among Rural Communities in Tibiri

3.2.1. Knowledge wash of rural communities

The results of the study conducted among **200 households** regarding general knowledge of water- and hygiene-related diseases are presented in **Table 2**.

Table 2 Knowledge of participants regarding WASH in Tibiri (*n*=200)

Variable	**Categorie**	**N (%)**
Do you think all these water sources are safe?	Yes No	50 (25 %) 150 (75 %)
Do you know diseases related to unsafe water?	Yes No	120 (60 %) 80 (40 %)
Do you know diseases that handwashing can prevent?	Yes No	140 (70 %) 60 (30 %)
	Dig or repair protected wells and boreholes	120 (60 %)
	Build latrines for households, schools	140 (70 %)

In your opinion, what can the community do to improve water and sanitation?	Organize hygiene awareness campaigns, including handwashing	110 (55 %)
	Stop open defecation and promote safe sanitation practices	130 (65 %)
	Clean and maintain water points regularly	100 (50 %)
	Form community water and sanitation committees	80 (40 %)
	Other / suggestions from the community	20 (10 %)
What are the critical moments for handwashing?	After using the toilet	164 (25,80%)
	Before eating	167 (26,30%)
	Before preparing meals	167(26,30)
	After changing a child's diaper or helping a child with the toilet	105(16,54%)
	After touching waste or garbage	25(3,94%)
	Before feeding a baby	7(1,1%)
Can you explain the benefits of using soap when washing your hands?	Yes – prevents diseases (e.g., diarrhea, cholera, infections)	140(35,0 %)
	Yes – removes dirt and germs	110(27,5 %)
	Yes – keeps hands clean and healthy	90(22,5 %)
	No – do not know the importance	40(10,0 %)
	Other	20(5,0 %)
Knowledge on WAH	Good Poor	87(43,3%) 133(56,7%

These results indicate that general knowledge of water- and hygiene-related diseases is moderate. Approximately 70% of participants were aware of diseases that can be prevented through handwashing, and 60% knew about waterborne diseases.

To address WASH challenges in their communities, participants suggested several measures: construction or rehabilitation of protected wells and boreholes (60%), construction of household and health facility latrines (70%), hygiene and handwashing awareness campaigns (55%), ending open defecation and promoting improved sanitation practices (65%), establishment of water and sanitation management committees (40%), and maintenance of clean water points (50%).

These findings indicate that communities are aware of essential WASH interventions, but access and adoption remain challenging.

However, knowledge of critical handwashing moments was low. Only 25.8% of participants knew they should wash their hands after using the toilet, 26.3% after eating, 26.3% after preparing a meal, 16.54% after changing a child's diaper or assisting a child at the toilet, 3.94% after handling waste or garbage, and 1.1% before feeding a baby. Awareness of the importance of soap was also limited: 35% recognized its role in germ elimination, and 22.5% in keeping hands clean and healthy (Table 2).

These results are consistent with other KAP studies in rural areas of Sub-Saharan Africa and Asia, where general awareness is often higher than knowledge of the specific actions required to reduce health risks [7][23].

3.3. Wash attitudes of rural communities

The descriptive results of the study regarding the attitudes of the 200 participants toward WASH are presented in Table 3.

Table 3 Attitudes of participants regarding WASH in Tibiri (*n*=200)

Variable	**Strongly agree (N, %)**	**Agree (N, %)**	**Disagree (N, %)**	**Strongly disagree (N, %)**
Do you think it is important to wash your hands before eating and after using the toilet?	80(40 %)	70 (35 %)	40 (20 %)	20 (5 %)
Do you believe the water you use for drinking is safe for your family?	20 (10 %)	70 (35 %)	90 (45 %)	20(10 %)
Do you think everyone should use toilets rather than defecate in the open?	40 (20 %)	60 (30 %)	70 (35%)	30 (15 %)
Do you believe regular handwashing can help prevent diarrheal and other infections?	40 (20 %)	70 (35 %)	90 (45 %)	-
Do you think everyone in the village should participate in keeping the environment clean?	65 (32.5 %)	75 (37.5 %)	40 (20 %)	10 (5 %)
Would you be willing to attend a training or meeting on good hygiene practices?	110 (55 %)	70 (35 %)	20 (10 %)	0 (0%)

Overall Attitude	(N, %)
Positive attitude	128 (64 %)
Negative attitude	72 (36 %)

The analysis of Table 3 shows that the attitudes of the 200 participants toward WASH were mixed. About 40% of respondents strongly agreed and 35% moderately agreed on the importance of handwashing before eating and after using the toilet, while 25% did not consider it important.

Regarding the perception of water potability, less than 10% believed that the water they use is always safe for their family, 35% considered it often potable, and over half judged it rarely or never safe for consumption.

Concerning toilet use, 50% of respondents supported the abandonment of open defecation by community members, while an equal proportion felt there was no problem in continuing this traditional practice. As for handwashing as a means of disease prevention, the community was also divided: 55% believed in its effectiveness (strongly or moderately), compared to 45% who did not see it as an effective preventive measure.

Environmental cleanliness received strong support: 70% of participants believed it is a collective responsibility. Finally, the majority (90%) expressed willingness to participate in hygiene training and awareness activities, while only 10% were reluctant.

Overall, these findings indicate that households in Tibiri generally exhibit positive attitudes toward WASH, particularly in terms of community participation and willingness to learn. However, barriers remain: misperceptions about water potability, limited rejection of open defecation, and skepticism regarding the effectiveness of handwashing. These obstacles are consistent with those observed in other rural contexts in Sub-Saharan Africa and Asia, where favorable attitudes coexist with traditional beliefs and material constraints [22][9].

Therefore, strategies aimed at reinforcing positive attitudes and removing behavioral and infrastructural barriers appear to be essential for sustainably improving WASH practices and reducing waterborne diseases.

3.4. WASH practices of rural communities

The results of the study on WASH practices among the sampled households in Tibiri are presented in Table 4.

Table 4 Practices of participants regarding WASH in Tibiri (*n*=200)

Variable	Category	N (%)
Sources of water for drinking and cooking	unprotected dug well	102 (51 %)
	Borehole	98 (49 %)
	Surface water point	0 (0 %)
Water treatment before drinking	Boiling	50 (25 %)
	Filtration	20 (10 %)
	Chlorine	30 (15 %)
	Nothing	90 (45 %)
	Other	10 (5 %)
Water storage at home	Covered container	120 (60 %)
	Open container	70 (35 %)
	Other	10 (5 %)
If no latrine, where do you go?	Field(ODF)	170 (85 %)
	Public toilets	15(7.5 %)
	Other	15 (7.5 %)
Household waste management	Bury	8(4 %)
	Burn	8 (4 %)
	Throw in nature	184 (92 %)
	Other	10 (5 %)
Latrine maintenance	Daily cleaning	100 (50 %)
	Rarely	90 (45 %)
	Other	10 (5 %)
Use of soap for handwashing	Yes	90 (45 %)
	No	110 (55 %)
Washing and food storage	Wash with water	150 (75 %)
	Wash with soap	50 (25 %)
	Cook thoroughly	180 (90 %)
	Other	10 (5 %)
Hygiene of children and family members	Always	80 (40 %)
	Sometimes	100 (50 %)
	Rarely	20 (10 %)
Use of rainwater	Yes	140 (70 %)
	No	60 (30 %)
Practices on WASH	*Good* *Poor*	*86(43%)* *104(57%)*

These findings reveal a diversity of WASH practices among the sampled households in Tibiri (Table 4). Regarding water supply (for drinking and cooking), the main sources are unprotected wells (51%) and boreholes (49%). The widespread use of unprotected wells unfortunately exposes rural communities to an increased risk of waterborne diseases.

Household water treatment methods are also not widely practiced. Nearly half of households (45%) reported using no treatment method, while a minority used boiling (25%), chlorination (15%), or filtration (10%), highlighting a critical gap in water safety practices.

Regarding water storage, about 60% of households store water in covered containers (typically clay jars with lids), which is a good practice, but 35% use open containers, favoring microbial contamination.

In terms of sanitation, open defecation remains widespread (62.5%), reflecting persistent risky behaviors. Limited access to latrines and irregular maintenance also remain a challenge: only 50% of households clean latrines daily, emphasizing gaps in the hygienic use of existing facilities.

Waste management is also problematic: 92% of households reported disposing of garbage in the open, generating significant health and environmental risks.

Regarding hygiene, less than half of households (45%) consistently use soap for handwashing. Food hygiene is relatively better observed: 75% wash food with water, 25% with soap, and 90% cook meals properly. However, personal hygiene remains insufficient: only 40% of households maintain regular hygiene for children and other members, 50% do so occasionally, and 10% rarely.

Rainwater use is common (70% between July and October), but using it without prior treatment increases the risk of contamination.

Overall, WASH practices are mixed: positive behaviors such as using boreholes, storing water in covered containers, and proper food preparation coexist with risky practices, including open defecation, minimal water treatment, and low soap usage. These findings are consistent with other studies in Sub-Saharan Africa, where infrastructural, cultural, and behavioral constraints hinder the adoption of optimal practices [24].

In similar contexts, WASH interventions should adopt a holistic approach, integrating: improved access to safe water, provision of adequate sanitation facilities, active promotion of hygiene and sanitation, and community capacity building to ensure sustainable and resilient adoption of WASH practices.

4. Conclusion

The KAP study on WASH, conducted among 200 households in Tibiri, Dosso, Niger, revealed low knowledge levels (43.3%), generally positive attitudes (64%), but insufficient practices (43%), thereby exposing communities to an increased risk of waterborne diseases. This is the first study to systematically document WASH knowledge, attitudes, and practices in the commune of Tibiri and in similar rural contexts in Niger.

These findings highlight the need for integrated WASH approaches, combining improved access to safe drinking water and latrines (both domestic and school-based), promotion of safe sanitation with infrastructure maintenance, hygiene promotion and behavior change interventions, as well as community participation and capacity building. They also provide concrete guidance for policymakers and development actors to strengthen community resilience in similar rural contexts.

Finally, a more detailed analysis of results according to socio-demographic characteristics would help to better identify the most vulnerable groups and refine intervention strategies.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

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

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