

## Prevalence, Drivers and Clinical Features of Human Scabies at the Mfou Principal Prison, Centre Region of Cameroon

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### Abstract

**Background and aim:** Researches assessing the prevalence and magnitude of human scabies (HS) in Cameroonian penitentiaries are direly rare. The present study aimed to determine the prevalence, drivers and clinical features of HS in a Cameroonian prison.

**Methods:** We conducted a cross-sectional study from February to April 2014 at the Mfou Principal Prison (MPP), Cameroon, including all prisoners who voluntarily consulted the research team at the prison infirmary. The diagnosis was based on clinical findings, the examination being independently performed by two experienced dermatologists.

**Results:** Overall, 217 prisoners were enrolled, of whom 201 (92.6%) were males. Ages ranged from 14 to 60 years with a mean of  $32.4 \pm 9.5$  years. The prevalence of HS was 41.0% (95% confidence interval (CI): 34.5-47.5%). Eighty one (91.0%) infected prisoners presented classical scabies while 8 prisoners (9.0%) presented crusted scabies. Excoriations (85.4%) and crusts (83.1%) were the prevailing lesions while the infra-gluteal (92.1%) and the inter-gluteal (88.8%) regions were the leading lesion sites. After multivariable logistic regression analysis, a number of baths less than once daily (adjusted odds ratio (aOR) 11.23, 95% CI: 2.10-60.06;  $p=0.005$ ) and a number of laundries less than once weekly (aOR 16.27, 95% CI: 4.21-62.84;  $p<0.0001$ ) were the independent factors impacting scabies occurrence.

**Conclusion:** HS is highly prevalent at the MPP, driven by poor personal hygiene alongside a probable lack of health care. Prisoners should be counselled on healthy (personal) hygiene rules, and encouraged to adopt such habits; all necessary means should be made available accordingly.

**Keywords:** Human scabies; Prison; Prevalence; Risk factor; Cameroon

### Introduction

Scabies is an intensely pruritic and highly contagious infestation of the human skin by an ectoparasite called *Sarcoptes scabiei* var. *hominis*. Scabies is associated with poverty, overpopulation, poor personal hygiene, and war-centric pandemics [1-4]. The disease is particularly rampant in overcrowded places without adequate sanitation such as school milieu, nursing homes and prisons [1,3,5-7].

Nowadays, scabies endemicity in many tropical and sub-tropical countries around the world is well documented [3,5,6,8]. Similarly, institutions at risk such as prisons, especially in these countries are reputed with particularly high prevalences. In Benin for instance, Makoutode et al. reported a 45.5% prevalence of scabies at the Cotonou Civil Prison [9]. Likewise, the prevalence of scabies was 16%

and 2.2% respectively obtained in Mangalore (India) and Ghezel Hesar (Iran) prisons [10,11].

In Cameroon, a recent study conducted by Kouotou et al. pointed-out a resurgence of human scabies in Yaoundé [12]. Another survey undertaken by Bissek et al. showed a 2.8% prevalence of scabies in a Cameroonian indigenous rural population [13]. However, few data are available regarding the prevalence and magnitude of scabies among groups at risk such as prisoners in Cameroon. One study conducted by Demoures et al. [14] in a prison in Ngaoundéré (located in the Northern part of Cameroon) Figured out that scabies was one of the most frequent diseases encountered in this prison, highlighting thus how neglected were prisoners there incarcerated, in terms of health care.

Behind this finding, alongside a recent report from Tanzania revealing an epidemic of scabies in one of its prisons with 95% of inmates infected [15], we designed the present study, the overarching objectives of which were to determine the prevalence, determinants

and clinical features of human scabies infestation in a Cameroonian penitentiary.

## Methods

We undertook a cross-sectional study from February to April 2014 at the Mfou Principal Prison (MPP) which is well described elsewhere [16]. This is one of the six main prisons of the Centre region of Cameroon. It was constructed in 1976 with a capacity of 100 places, but 369 prisoners were currently detained during the study period.

This study was approved by the administrative authorities of the MPP, and was delivered an ethical clearance by the ethical review board of the Faculty of Medicine and Biomedical Sciences, Cameroon. All the procedures used were in line with the current revision of the Helsinki Declaration. The various aspects of the study were presented to all potential participants, and before inclusion, a written and signed informed consent form was provided by all those (or their guardians for minors) who volunteered to participate in the study.

Participants were prisoners who volunteered to take part in the study regardless of their age, sex or physical condition, and who were present at the prison during the study period. For the purpose of the study, free medical consultations were organized at the MPP infirmary. Prior to enrollment, many sensitization sessions were undertaken by the investigators. Concomitantly, the prison staff encouraged their inmates to attend these medical consultations, stressing on the huge advantages incurred. On the days of enrolment, prisoners willing to participate were directed to the prison infirmary.

Participants were consecutively and exhaustively enrolled during the study period using an anonymous, structured and pre-tested questionnaire. We collected data on socio-demographic characteristics (age, sex, marital status, religion and level of education), duration of imprisonment, number of baths per day, frequency of laundries per week, usage of sheets, sharing of clothes, presence of pruritus with the prevailing period (morning or evening), and the time of onset of pruritus and/or lesions. Then, a complete dermatological examination was independently carried-out by two experienced and well-trained dermatologists. Dermoscopy and/or skin scrapings/microscopy were not available to confirm or not the presence of the infecting parasite.

The diagnosis was confirmed in case the prisoner complained of night prevailing pruritus with an history of pruritus in the close entourage and/or notion of contamination, alongside clinical findings: specific (scabious furrows, scabious nodules, pearly vesicles) and non-specific lesions of scabies (cankers, papules or papulo-vesicles, crusts or crusty dots, ulcerations, scraping ridges), found at meaningful body sites (interdigital spaces, wrists, inter- and infra-gluteal creases, armpits, external genital organs). Indeed, clinical assessment of scabies has been shown with good sensitivity (96.2%) and specificity (98%) [17]. All discrepant diagnoses between the two dermatologists were resolved by discussion and consensus.

Treatment was given free of charge, consisting in an anti-scabious solution containing benzoate of benzyle at 30%, to be applied by infected inmates and their entourage on the whole body two times at a 24 hour-interval, after a lukewarm bath on a humid skin. This process was to be repeated one week later. Besides, clothes and bedding were to be decontaminated by washing them with warm water followed by spraying of an anti-scabious containing pyrèthrinöide. No quarantine measures were applied.

Data were entered and analyzed using SPSS version 20.0 (IBM, Chicago, Illinois, USA). Results are presented as mean  $\pm$  Standard Deviation (SD) or count (proportion) as appropriate. Qualitative variable comparison used the Chi square test or the Fisher exact test where applicable. Odds Ratios (ORs) with 95% confidence intervals (CI) served to assess the drivers of scabies infestation among prisoners. They were calculated by univariable and backward multivariable logistic regression analyses while adjusting for confounders. For this purpose, level of education was grouped into "low" (never went to school & primary school) and "high" (secondary school & university/college). The number of detainees per cell was dichotomized in " $\leq 10$ " and " $>10$ " (congested cells). Prisoners having at least one bath per day or performing at least one laundry per week were said to have a "good personal hygiene", and those who did not, a "poor personal hygiene". All variables with a p value  $<0.25$  in univariable logistic regression were introduced in the initial multivariable model. Results were considered statistically significant only if  $p < 0.05$ .

## Results

Two hundred and seventeen inmates, out of the 369 present at the MPP during the study period, accepted to be included in this survey, hence a response rate of 58.8%. Ages of participants ranged from 14 to 60 years old, with a mean of  $32.4 \pm 9.5$  years. The two predominant age groups were 21-30 and 31-40 years: 34.6% each (Table 1). There were 201 males (92.6%), giving a sex ratio of 12.6/1. Christianity was the dominating religion: 189/217 (87.1%). Besides, almost half of inmates (45.6%) had attended the primary school, and not more than 11 (5.1%) prisoners reached the university or college. Additionally, 137 (63.1%) prisoners were singles and 74 (34.1%) were married (Table 1). Duration of incarceration varied from 2 weeks to 40 months, with a mean of  $9.1 \pm 7.7$  months.

Variable	Males: Number (percentage %)	Females: Number (percentage %)	Total: Number (percentage %)
Age groups (years)			
$\leq 20$	21 (10.4)	0 (0.0)	21 (9.6)
21 - 30	69 (34.3)	6 (37.5)	75 (34.6)
31 - 40	71 (35.3)	4 (25.0)	75 (34.6)
41 - 50	31 (15.4)	2 (12.5)	33 (15.2)
51 - 60	9 (4.5)	4 (25.0)	13 (6.0)
Religion			
Christian	173 (86.1)	16 (100)	189 (87.1)
Muslim	24 (11.9)	0 (0.0)	24 (11.1)
Other	4 (2.0)	0 (0.0)	4 (1.8)
Level of education			
Never went to school	20 (10.0)	4 (25.0)	24 (11.1)
Primary school	94 (46.8)	5 (31.3)	99 (45.6)
Secondary school	80 (39.8)	3 (18.7)	83 (38.2)
University/College	7 (3.5)	4 (25.0)	11 (5.1)

Marital status			
Single	132 (65.7)	5 (31.3)	137 (63.1)
Married	65 (32.3)	9 (56.3)	74 (34.1)
Widow(er)	1 (0.5)	1 (6.2)	2 (0.9)
Divorced/ separated	3 (1.5)	1 (6.2)	4 (1.9)

**Table 1:** Socio-demographic background of the study population.

Eighty nine respondents were diagnosed with human scabies, hence a prevalence of 41.0% (95% CI: 34.5-47.5%). Among these infected prisoners, pruritus was the main complaint with more than half of them (59.5%) experiencing pruritus only at night. There were 13 cells, the number of infected detainees per cell ranging from 0 (0.0%) to 35 (63.6%), with 8 (61.5%) cells characterized as congested (>10 prisoners in the cell).

Type of lesions	Males (86): N (%)	Females: (3) N (%)	Total (89): N (%)
Excoriations	74 (86.0)	2 (66.7)	76 (85.4)
Crusty lesions	72 (83.7)	2 (66.7)	74 (83.1)
Scratch marks	71 (82.6)	3 (100.0)	74 (83.1)
Vesicles	69 (80.2)	3 (100.0)	72 (80.9)
Papules	69 (80.2)	3 (100.0)	72 (80.9)
Papulo-vesicles	47 (54.7)	1 (33.3)	48 (53.9)
Pustules	45 (52.3)	2 (66.7)	47 (52.8)
Burrows	43 (50.0)	2 (66.7)	45 (50.6)
Nodules	30 (34.9)	0 (0.0)	30 (33.7)

Location of lesions			
Infra- gluteal	80 (93.0)	2 (66.7)	82 (92.1)
Inter-gluteal	79 (91.9)	0 (0.0)	79 (88.8)
Inter-digital	77 (89.5)	1 (33.3)	78 (87.6)
Glans	72 (83.7)	0 (0.0)	72 (80.9)
Elbow	67 (77.9)	2 (66.7)	69 (77.5)
Wrist	63 (73.3)	2 (66.7)	65 (73.0)
Umbilical	41 (47.7)	2 (66.7)	43 (48.3)
Posterior trunk	38 (44.2)	0 (0.0)	38 (42.7)
Areola	33 (38.4)	3 (100)	36 (40.4)
Anterior trunk	35 (40.7)	0 (0.0)	35 (39.3)
Knee	35 (40.7)	0 (0.0)	35 (39.3)
Axilla	34 (39.5)	0 (0.0)	34 (38.2)
Diffuse	33 (37.4)	0 (0.0)	33 (37.1)
Palms	27 (31.4)	0 (0.0)	27 (30.3)
Sole	24 (27.9)	0 (0.0)	24 (27.0)
Face	15 (17.4)	0 (0.0)	15 (16.9)

**Table 2:** Clinical features of scabies [N (%) = Number (percentage in %)].

Two clinical types of scabies were recorded. Indeed, 81 (91.0%) infected prisoners exhibited classical scabies (an example shown on Figure 1), the infection being complicated by impetiginization among 9 inmates (11.1%), while 8 prisoners (9.0%) presented crusted scabies, an example of which is depicted by Figure 2.





**Figure 1:** Excoriations in finger webs during scabies.

We recorded specific and non-specific lesions of scabies (Table 2). Excoriations were the prevailing lesions (85.4%), followed by crusty lesions (83.1%) and scratch marks (83.1%). Specific lesions included among others, vesicles (80.9%) and nodules (33.7%). Concerning the site of localization, lesions were either focal or diffused (Figures 1&2).



**Figure 2:** Excoriations and Crusty lesions during scabies.

The infra-gluteal region (92.1%) was the leading site of lesions, followed by the inter-gluteal (88.8%) and inter-digital (87.6%) spaces (Table 2).

Variable	Scabies (89): N (%)	OR (95% CI)	p value	<sup>a</sup> a OR (95% CI)	p value
Age (years)	/	0.982 (0.954-1.011)	0.219*	/	
Sex				/	
Female	3 (18.8)	/			
Male	86 (42.8)	3.241 (0.896-11.727)	0.073*		
Marital status				/	
Single	62 (45.3)	0.827 (0.113-6.039)	0.851		
Married	25 (33.8)	0.510 (0.068-3.840)	0.513		
Widow(er)	0 (0.0)	0	0.999		
Divorced/separated	2 (50)	1	/		
Religion					
Christian	78 (41.3)	0.234 (0.024-2.294)	0.212*	0.461 (0.028-7.592)	0.588
Muslim	8 (33.3)	0.167 (0.015-1.869)	0.146*	0.095 (0.004-2.045)	0.133
Other	3 (75)	1	/	1	/
Level of education					
Low	52 (48.6)	1.865 (1.079-3.226)	0.026**	1.825 (0.962-3.472)	0.066*
High	37 (33.6)	1		1	
Duration of incarceration (months)	/	0.963 (0.927-1.000)	0.053*	/	
At least one bath per day					
Yes	67 (34.7)	1		1	
No	22 (91.7)	20.687 (4.721-90.653)	<0.0001**	11.226 (2.098-60.063)	0.005**
At least one laundry per week					
Yes	58 (31.7)	1		1	
No	31 (91.2)	22.270 (6.540-75.834)	<0.0001**	16.272 (4.213-62.842)	<0.0001**
Number of detainees per cell				/	
≤ 10	6 (19.4)	1			
> 10	83 (80.6)	3.356 (1.316-8.547)	0.011**		
Sharing of clothes or bedding				/	
No	74 (38.7)	1			
Yes	15 (57.7)	2.156 (0.939-4.948)	0.070*		

\*p<0.25; \*\*p<0.05; N(%) = number (percentage in %); CI = Confidence Interval; OR = (unadjusted) Odds Ratio  
<sup>a</sup>aOR = adjusted odds ratio: age, sex, religion, level of education, duration of incarceration, baths/day, laundry/week, number of detainees per cell and sharing of clothes were introduced in the initial multivariable model. Using stepwise backward procedure, age, sharing of clothes, sex, duration of incarceration and number of detainees per cell were successively removed from the model. The final model (step 6) included: religion, education, baths/day and laundry/week. The coefficient of determination of this final model was 0.343.

**Table 3:** Drivers of scabies infection.



In univariable logistic regression analyses (Table 3), low educational level (OR 1.87, 95% CI: 1.08-3.23;  $p=0.026$ ), number of baths less than once daily (OR 20.69, 95% CI: 4.72-90.65;  $p < 0.0001$ ), number of laundries less than once weekly (OR 22.27, 95% CI: 6.54-75.83;  $p<0.0001$ ) and number of detainees  $>10$  per cell (OR 3.36, 95% CI: 1.32-8.55;  $p=0.011$ ) were associated with scabies infection. The male sex, duration of incarceration (in months) and sharing of clothes yielded borderline statistical significances:  $p=0.073$ ,  $p=0.053$  and  $p=0.070$  respectively (Table 3). In multivariable logistic regression analysis, all variables with  $p<0.25$  in univariable analyses were introduced in the initial model. Using a stepwise backward procedure, only 4 variables remained in the final model (step 6; Table 3). Eventually, a number of baths less than once daily (adjusted OR 11.23, 95% CI: 2.10-60.06;  $p=0.005$ ) and a number of laundries less than once weekly (adjusted OR 16.27, 95% CI: 4.21-62.84;  $p<0.0001$ ) were the 2 independent factors driving scabies infection among our prisoners. The coefficient of determination of this final model was 0.343.

## Discussion

Our results figured out a high rate of scabies infection. Indeed, almost half (41%) of our inmates were infected with scabies. Furthermore, this study reinforces the claim that poor personal hygiene is an important factor significantly impacting the occurrence of scabies infection. We found for instance that prisoners having less than one bath per day had an 11-fold increased risk of being infected, and those performing less than one laundry per week, a 16-times augmented likelihood of becoming infected with scabies. On the contrary, low educational level and cell congestion, though significantly associated with scabies infection in univariable logistic regression analyses, yielded non-significant results when adjusting for other confounders. Our results suggest enhancing and strengthening the health care provided to prisoners in our settings. Additionally, they should be educated on healthy (personal) hygiene rules, and all means necessary to adopt such healthy habits ought to be made available.

The 41% prevalence of scabies infestation recorded at the MPP is particularly high compared with the 2.8% prevalence registered among inhabitants of a rural setting in the Mbam Division, Centre region of Cameroon [13]. Likewise, our prevalence is higher than the 8.4% observed by Mbuagbaw et al. after a study conducted in Yaoundé in the early 90s [18]. Nonetheless, our findings are consistent with previous reports pointing out a high prevalence of human scabies among sub-Saharan African (SSA) prisoners [9,15]. Indeed, a comparable 45.5% prevalence was registered in a prison in Benin [9], while prevalence more than twice equal to ours (95%) was reported in Tanzania [15]. On the contrary, lower rates have been reported in India (16%) [10] and Iran (2.2%) [11].

This peculiarly elevated prevalence of human scabies in SSA prisons has been explained by the very poor sanitary conditions prevailing in these milieus alongside overpopulation or overcrowding [5,9,14,15], remembering that scabies is transmitted through inter-human contact. In this study for instance, almost 400 prisoners were detained in a prison constructed to host not more than 100 inmates. We observed also that the majority of infections originated from the most overcrowded cells, in keeping with previous observations from the Ghezel hesar prison in Iran [11]. Furthermore, cell congestion (number of detainees  $>10$  in the cell) was associated with scabies infestation, though this association disappeared when adjusting for other confounders. If the size of the study population has been bigger, and/or if the cutoff to define congestion has been lower, perhaps this

association could have remained significant in multivariable analysis, and we could have shown indeed that overpopulation is a factor impacting scabies occurrence in our settings. Further studies are warranted to better investigate such an association in our prisons.

However and interestingly, our results pointed-out a close and intense relationship between scabies infection and poor personal hygiene, in terms of irregular baths and laundries, corroborating the literature [1-4]. Why our prisoners were not used to regularly taking their baths or performing the laundry is an issue needing a thorough investigation. As a matter of fact, if there is no water, soaps and/or other necessary stuffs, it is obvious that it may be impossible to have a daily bath or perform a weekly laundry. Additionally, it is not unlikely that certain prisoners, even if all means are made available, will not have a rigorous personal hygiene. There is need to undertake further studies, especially qualitative ones, to better capture the reasons pertaining the observations we have made. But for now, our prisoners shall be counselled and educated to avoid scabies infestation and spreading. We found that low educational level could be a driver of scabies infection, but this warrants better assessment.

In the male population, the infra-gluteal region was the most affected one (93.0%) followed by the inter-digital region and the glans (89.5% and 83.7% respectively), concurring with previous reports from Kouotou et al. [12] who reported the magnitude of scabies infection in dermatology services located in Yaoundé, Cameroon. On the other hand, the areola was the most frequent site of lesions in the female population (100%). These are locations observed in classical scabies [8]. Contrarily, the face (16.8%), the sole (26.9%) and the palms (30.3%) were the least affected zones. These findings are not surprising, given that these latterly-mentioned regions are known to be more preponderantly affected in cases of children infestation [17]. Moreover, diffused lesions were found in more than one-third (37.1%) of cases. The spreading of lesions may be a testimony of the chronic evolution of the infection; hence we can infer that a huge number of inmates may have started developing the disease a long while ago though we did not ask the question. This may therefore be an indirect reflection of the poor health conditions or lack of health care prevailing in this prison.

Specific and non-specific lesions of scabies were observed amongst our inmates. In fact, the prevailing specific lesions were papulo-vesicles (80.9%), burrows (50.3%) and scabious nodules (33.7%) while non-specific lesions were dominated by excoriations (85.4%), crusty lesions (83.1%), scratch marks (83.1%) and papules (80.9%). The presence of specific lesions helped to ascertain the diagnosis given their characteristic topography, along with the rhythm and intensity of pruritus, and contamination of mates. Moreover, this high proportion of scratch marks, crusty lesions and papules could also be the testimony of the chronicity of the infection. Similar descriptions have indeed been previously made by Kouotou et al. [12].

Unfortunately, this study has some limitations. First, dermoscopy and/or skin scrapings/microscopy were not available to confirm the diagnosis of human scabies. Besides, the prison infirmary was not provided with a laboratory and the prisoners could not be transported out of the prison for laboratory investigations. Therefore, our diagnosis was solely based on results of clinical evaluation. However, it has been clearly shown that clinical assessment of scabies yields good sensitivity (96.2%) and specificity as well (98%) [17]. Furthermore, to increase accuracy and reliability, two experienced and well-trained dermatologists independently examined each patient, and discordant results were resolved by discussion and consensus. Moreover, there have some claims that microscopic assessment of human scabies has a

low sensitivity and is operator-dependent [19]. Second, we experienced a low response rate (58.8%) with a consequential relative small sample size. Additionally, no minimal sample size calculation was undertaken. These flaws may have possibly precluded us from obtaining more statistically significant results. Third and eventually, although our results are not generalizable to the Cameroonian inmate population because driven from only one prison, they give a preliminary picture of what the epidemiological and clinical features of scabies infection in our prisons may look like. Further studies are warranted to better elucidate these features.

## Conclusion

In clear, human scabies infection is highly prevalent at the Mfou Principal Prison. This high prevalence may be driven by poor personal hygiene alongside a probable lack of health care. It is high time the Cameroonian Government put in place strong and efficient measures to enhance and strengthen the health care provided to our inmates. Besides, prisoners should be counselled on healthy (personal) hygiene rules, and encouraged to adopt such habits; all necessary means should be made available in this concern. Moreover, further studies are warranted, which will better capture the magnitude and drivers of scabies infection in our penitentiaries.

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