

Malaria. A prospective cohort study sought to determine the association between *P. vivax* and severe malaria (SM).¹ Data from this study are reproduced below and are accompanied by questions.

		Severe Malaria?	
		Yes	No
Age	0 to < 2 years	173	846
	2 to < 5 years	207	2216

1. Can prevalence be calculated using these data? Why or why not?
2. What is the prevalence of Severe Malaria among children aged 0 to < 5 years?
3. What is the relative risk of Severe Malaria for participants under 2 years of age compared with those aged between 2 and 5?

¹ Genton B, D'Acremont V, Rare L, et al. Plasmodium vivax and Mixed Infections Are Associated with Severe Malaria in Children: A Prospective Cohort Study from Papua New Guinea. Rogerson S, ed. *PLoS Med.* 2008;5(6):e127. doi:10.1371/journal.pmed.0050127

		Severe Malaria?	
		Yes	No
Age	0 to < 2 years	173	846
	2 to < 5 years	207	2216

4. Can the odds ratio be calculated using these data? Why or why not?

5. What is the odds ratio for Severe Malaria for participants under 2 years of age compared with those aged between 2 and 5?

6. Compare the relative risk to the odds ratio.

7. Interpret the Relative Risk from #3.

8. Interpret the Odds Ratio from #5.

Cytokines. A case-control study was undertaken to illuminate the relationship between venous thrombosis (VT) and different cytokines (IL-1 β , IL-6, IL-8, IL-10, IL12p70).² From a larger national study, 506 participants with VT were identified. Another sample of 1,464 participants without VT was randomly-selected. Excerpts from the article follow, accompanied by questions.

		IL-1 β	
		Detected	Undetected
Group	Cases	289	217
	Controls	850	614

1. Can prevalence be calculated using these data? Why or why not?
2. What is the odds ratio comparing cases to controls?
3. A 95% confidence interval for odds ratio was calculated to be [0.8, 1.2]. Do you think the Cases and Controls groups differ in the presence of IL-1 β ?

² Christiansen SC, Næss IA, Cannegieter SC, Hammerstrøm J, Rosendaal FR, Reitsma PH. Inflammatory Cytokines as Risk Factors for a First Venous Thrombosis: A Prospective Population-Based Study. Greaves M, ed. *PLoS Med.* 2006;3(8):e334. doi:10.1371/journal.pmed.0030334

Cytokines, Part 2. The table below is from the same study as that in *Cytokines*.

		IL-6	
		Detected	Undetected
Group	Cases	194	312
	Controls	547	917

1. Can prevalence be calculated using these data? Why or why not?
2. What is the odds ratio comparing cases to controls?
3. A 95% confidence interval for odds ratio was calculated to be [0.9, 1.3]. Do you think the Cases and Controls groups differ in the presence of IL-6?

Leptospirosis. A study was conducted to evaluate the performance of a Rapid Diagnostic Test (RDT) for leptospirosis in French tropical territories.³ PCR was used as a gold standard to classify patients as either having Leptospirosis or being Controls. Germane results are reproduced below, and questions follow.

		Leptospirosis	Control
IgM RDT assay	Positive	168	14
	Negative	19	207

1. Calculate the following:
 - a. Sensitivity
 - b. Specificity
 - c. False Positive Error Rate
 - d. False Negative Error Rate
 - e. Positive Predictive Value
 - f. Negative Predictive Value
 - g. Likelihood Ratio +
 - h. Likelihood Ratio -

³ Goarant C, Bourhy P, D'Ortenzio E, et al. Sensitivity and Specificity of a New Vertical Flow Rapid Diagnostic Test for the Serodiagnosis of Human Leptospirosis. Büscher P, ed. *PLoS Negl Trop Dis*. 2013;7(6):e2289. doi:10.1371/journal.pntd.0002289

Schistosoma. A cross-sectional study was conducted to determine the diagnostic properties of urine microscopy for detecting *Schistosoma haematobium* infections in South African young women.⁴ Table 3 from this article is reproduced below, followed by questions.

Pseudo gold standard ^a	Urine microscopy ^b		
	Negative	Positive	Total
Negative	203	67	270
Positive	303	161	464
Total	506	228	734

Sensitivity (95% CI): 34.7 (30.4 to 37.0)
Specificity (95% CI): 75.2 (69.6 to 80.2)

Missing data was not included in this analysis. CI: Confidence Interval

a. Sandy patches identified using clinical photocolposcopic examination or by computerised colourimetric image analysis [17, 26]

b. *Schistosoma haematobium* ova detected in a single urine sample by microscopy [27].

<https://doi.org/10.1371/journal.pone.0191459.t003>

1. Calculate the following:
 - a. Sensitivity
 - b. Specificity
 - c. False Positive Error Rate
 - d. False Negative Error Rate
 - e. Positive Predictive Value
 - f. Negative Predictive Value
 - g. Likelihood Ratio +
 - h. Likelihood Ratio –

⁴ Galappaththi-Arachchige HN, Holmen S, Koukounari A, et al. Evaluating diagnostic indicators of urogenital *Schistosoma haematobium* infection in young women: A cross sectional study in rural South Africa. Knight M, ed. *PLOS ONE*. 2018;13(2):e0191459. doi:10.1371/journal.pone.0191459

Hemorrhage. Researchers wanted to compare the misoprostol and oxytocin for prevention of postpartum hemorrhage (PPH) for mothers in sub-Saharan Africa.⁵ Excerpts from the journal article are below, followed by questions:

Of 8,867 mothers screened for eligibility from 23 September 2012 to 9 September 2013, 4,314 were eligible. A total of 2,369 (55%) declined participation in the study, and 1,140 were enrolled, received a randomized treatment, and completed study procedures. [An equal number of mothers were assigned to each treatment.] Demographic and clinical characteristics were similar between the two treatment groups. Primary PPH occurred in 163 (A) participants in the misoprostol group and 99 (B) participants in the oxytocin group (RR C , 95% CI 1.32 to 2.05, $p < 0.001$; absolute risk difference D , 95% CI 6.44 to 16.1), corresponding to a number needed to treat of E (meaning that E women would need to be treated with F instead of G to prevent one case of PPH).

1. What is the risk for each group (A and B)?

2. Why is it appropriate to calculate relative risk for this study?

3. What is the relative risk for participants in the misoprostol group relative to the oxytocin group (C)?

4. What is the absolute risk difference (D)?

5. What is the number needed to treat (E)?

6. What are F and G so that the interpretation is true?

⁵ Atukunda, E. C., Siedner, M. J., Obua, C., Mugenyi, G. R., Twagirumukiza, M., & Agaba, A. G. (2014). Sublingual misoprostol versus intramuscular oxytocin for prevention of postpartum hemorrhage in Uganda: a double-blind randomized non-inferiority trial. *PLoS medicine*, 11(11), e1001752. <https://doi.org/10.1371/journal.pmed.1001752>