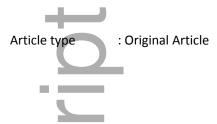
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Hepatitis E virus infection in swine workers: A meta-analysis

Running title: Hepatitis E virus in swine workers

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Hepatitis E virus (HEV) infects both humans and animals. Swine has been confirmed to be the principal natural reservoir, which raises a concern that HEV infection would be substantially increasing among swine workers. The present study calculated the pooled prevalence of IgG antibodies against HEV among swine workers and the general population in previous cross-sectional studies. We conducted a meta-analysis comparing the prevalence of HEV infection between swine workers and the general population, including local residents, blood donors, and non-swine workers. Through searches in three databases (PubMed and OVID in English, and CNKI in Chinese)

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and after study selection, a total of 32 studies from 16 countries (from 1999 through 2018) were included in the meta-analysis. A random effects model was employed in the study; an I² statistic assessed heterogeneity and the Egger's test detected publication bias. The comparative prevalence of anti-HEV IgG was pooled from the studies. Compared to the general population, the prevalence ratio (PR) for swine workers was estimated to be 1.52 (95% CI 1.38-1.76) with the I² being 71%. No publication bias was detected (*P*=0.40). A subgroup analysis further indicated increased prevalence of anti-HEV IgG in the swine workers in Asia (PR=1.49, 95% CI: 1.35-1.64), in Europe (PR=1.93, 95% CI: 1.49-2.50), and in all five swine-related occupations, including swine farmers, butchers, meat processors, pork retailors and veterinarians (PR ranged between 1.19 and 1.75). In summary, swine workers have a relatively higher prevalence of past HEV infection, and this finding is true across swine-related occupations, which confirms zoonotic transmission between swine and swine workers.

Key word: Hepatitis E virus, HEV; swine worker; meta-analysis; zoonosis **Impacts**

- Hepatitis E virus is a zoonotic virus that has been wide-spread in low-, middle-, and high-income countries. Swine has been confirmed to be the principal natural reservoir.
- The pooled prevalence of anti-HEV IgG has been estimated to be significantly higher in swine workers than in the general population, especially in Asia and Europe, regardless of socioeconomic circumstances of country.
- We demonstrate that the prevalence of anti-HEV IgG increased across five swine-related occupations, including swine farmers, butchers, meat processors, pork retailors, and veterinarians, suggesting substantial risk of cross-species transmission.

Introduction

Hepatitis E virus (HEV) is a single-strand positive RNA virus that causes hepatitis E. HEV genome consists of 7.2 kb, with 3 or 4 overlapping open reading frames (ORF) This article is protected by copyright. All rights reserved (Mushahwar, 2008; Nair et al., 2016). So far, HEV has been classified into seven genotypes (Smith et al., 2014). Genotypes 1 and 2 infect only humans, whereas other genotypes infect diverse species including humans (genotype 3, 4, and 7), swine (genotype 3 and 4), wild boar (genotype 3-6), rabbits (genotype 3), deer (genotype 3), mongooses (genotype 3), yaks (genotype 4), and camels (genotype 7) (Nan & Zhang, 2016). Swine has been confirmed to be a principal reservoir based on evidence from both epidemiological observations and experimental studies. The prevalence of antibodies against HEV (anti-HEV) has been reported to range between 8% and 93% among swine across the world which is much higher than other animal reservoirs, with variation in different swine herds and countries (Salines, Andraud, & Rose, 2017). Additionally, a phylogenetic analysis has demonstrated that human and swine HEV strains isolated from the same regions share high sequence identities of up to 91.3-100%, suggesting a close phylogenetic relationship (Liu et al., 2012). Experimental cross-species transmission of HEV has also been confirmed across humans, non-human primates, and swine with genotype 3 and 4 (Doceul, Bagdassarian, Demange, & Pavio, 2016).

Swine workers, including swine farmers, butchers, meat processors, pork retailers, and veterinarians are routinely exposed to swine and are consequently at possible risk of HEV infection. It has been documented that the prevalence of anti-HEV IgG in swine workers ranged between 3.3% (swine farmers, Italy) and 75.9% (swine farmers, China), which is higher than that in the general population in the same regions (De Schryver et al., 2015). However, some studies have reported a similar prevalence of HEV between swine workers and the general population, such as in one study in Thailand (Hinjoy et al., 2013). Additionally, it remains unclear which occupation is more likely to be infected with HEV. A study of anti-HEV IgG prevalence in occupations including butcher, meat processor, swine farmer and veterinarian reported relatively higher anti-HEV IgG in butchers and meat processors, but differences were not significant(Yan et al., 2007).

Because there are conflicting findings of increased prevalence of HEV infection in swine workers relative to the general population, this study combined previous findings in a meta-analysis. This study calculated the prevalence of HEV infection in swine workers compared to the general population, and further determined possible regions and occupations associated with increased prevalence of HEV infection.

Materials and Methods

Data sources

Two international databases, PubMed and OVID, and one Chinese database, CNKI, were searched for studies focusing on HEV infection among swine workers from their inception to April 2017. The data were subsequently updated until April 2018 by using the same strategy. The search terms "Hepatitis E Virus" and "swine" were used as shown in Table 1. Two independent investigators conducted the search and then determined if a study was potentially related to our study objective according to its title and abstract. Studies that were considered acceptable by either investigator were added to NoteExpress version 3.2 (Aegean Technology Co. Ltd., Beijing, China) for further selection.

Study selection

The full text of the retrieved studies was reviewed for selection. The inclusion criteria were as follows: 1) the study was cross-sectional; 2) the study included both swine workers and the general population in the same region; and 3) anti-HEV IgG was examined and reported. The exclusion criteria were as follows: 1) the study was a conference article or abstract; 2) the study repeated findings from a previous study; or 3) the study was about wild boars. The two investigators independently carried out the selection. Conflicting decisions were addressed by negotiation or further judged by a third investigator.

Data extraction

The selected studies were read for data extraction. The data of interest included author, This article is protected by copyright. All rights reserved year of publication, sampling site, country or region of sampling, time of sampling, definition of occupation and general population, sample size of both swine workers and general population, number of HEV infections in both swine workers and the general population, and laboratory examination methods. These data were retrieved by one investigator and then confirmed by another investigator. For studies that only provided sample size and prevalence of HEV infection, we calculated the number of infections.

Statistical analysis

The meta-analysis was conducted with R software version 3.4 (R Development Core Team, Vienna, Austria) and the package meta version 4.8 (Guido Schwarzer, Baden-Württemberg, Germany). To pool the comparison of HEV infection in swine workers and the general population, the prevalence ratio (PR) was estimated across the included studies with a random effect. An I² statistic was calculated to assess heterogeneity across studies, with an I² greater than 50% considered to be high heterogeneity. The Egger's test was used to detect potential publication bias. Additionally, a subgroup analysis was conducted by stratifying by continent of study and occupation.

Results

Data retrieval and study selection

As shown in Fig.1, a total of 1987 studies were initially found in CNKI, PubMed and OVID, in which 234 studies were potentially related to our study objectives and had a full text retrieved. Subsequently, 204 studies were excluded with reasons listed in Fig.1, and two studies were added in an updated search, yielding 32 studies for the meta-analysis (Bouwknegt et al., 2008; Caruso et al., 2017; De Sabato et al., 2017; Drobeniuc et al., 2001; Engle, Yu, Emerson, Meng, & Purcell, 2002; Galiana, Fernandez-Barredo, Garcia, Gomez, & Perez-Gracia, 2008;Hinjoy et al., 2013; Hongwei, 2009;Jiang Xin, Zheng Renshu, & Shijuan, 2009; Kang et al., 2017; Krumbholz et al., 2014; Krumbholz et al., 2012; Lange et al., 2017; Lee et al., 2013; This article is protected by copyright. All rights reserved

Liang et al., 2014; Liu Xiaogui et al., 2007;Love, Bjornsdottir, Olafsson, & Bjornsson, 2018; Lu Yihan et al., 2006; Masia et al., 2009;Meng et al., 1999; Meng et al., 2002; Nong Chushi, Li Yanping, & Yi, 2007; Olsen, Axelsson-Olsson, Thelin, & Weiland, 2006; Silva et al., 2012; Traore et al., 2015; Utsumi et al., 2011; Vivek & Kang, 2011; Wu Hongzhao, Liao Ziping, Wang Pingping, Lou Yongjin, & Wenzhong, 2018; Wu Yong et al., 2016; Yan et al., 2007; Yu et al., 2009; Zheng et al., 2006). Of the included studies, 24 were published in English and 8 in Chinese. The year of publication ranged from 1999 to 2018, and the majority of studies were conducted in either Asia (n=17) and Europe (n=11). In the studies, the swine workers included swine farmers, butchers, meat processors, pork retailers and veterinarians, whereas the general population included local residents and blood donors. Characteristics of the included studies are shown in the Supplementary Table.

Meta-analysis

By combining 32 studies with a random effect (Fig.2), the pooled prevalence of anti-HEV IgG was determined to be significantly higher in the swine workers (32.85%) than in the general population (21.70%), with a corresponding PR of 1.52 (95% CI: 1.38-1.76) (Table 2). However, the heterogeneity was high, as indicated by the I^2 being 71%. Publication bias was not indicated through the Egger's test

(*P*=0.40).

The included studies that reported prevalence of anti-HEV IgG were conducted in different continents, including Asia (n=17), Europe (n=11), Africa (n=1), North America (n=2), and South America (n=1). According to a subgroup analysis stratified by continent (Fig.3; Table 2), the difference in the pooled prevalence of anti-HEV IgG between swine workers and the general population remained significant in Asia (PR=1.49, 95% CI: 1.35-1.64) and Europe (PR=1.93, 95% CI: 1.49-2.50), whereas it was not significant in North America (PR=0.97, 95% CI: 0.43-2.18). Because only one study was conducted in Africa and South America, estimates for these continents may be not generalizable. Additionally, heterogeneity was low (I²=32%) in Europe, This article is protected by copyright. All rights reserved

whereas it was high in other subgroups ($I^2 \ge 78\%$).

In our study, swine workers could be a part of any swine-related occupation. In the included studies, some contained more than one occupation. According to a subgroup analysis stratified by occupation (Fig.4; Table 2), the difference in the pooled prevalence of anti-HEV IgG between swine workers and the general population also remained significant. Compared to the general population, the PRs were higher for butchers (PR=1.75, 95% CI: 1.31-2.35), swine farmers (PR=1.51, 95% CI: 1.32-1.74), meat processors (PR=1.46, 95% CI: 1.13-1.89), veterinarians (PR=1.36, 95% CI: 1.15-1.61), and pork retailors (PR=1.19, 95% CI: 1.09-1.29). The heterogeneity was only low for swine veterinarians (I²=14%) and pork retailers (I²=0%), whereas it was high for all other occupations (I² \geq 81%).

Discussion

Through a meta-analysis of previous studies, we determined that the PR of the pooled prevalence of anti-HEV IgG in swine workers compared to the general population was as high as 1.58, suggesting swine workers are more likely to be infected with HEV than the general population by 50%. It was confirmed that swine workers have substantially increased prevalence of HEV infection. As the majority of previous studies focusing on anti-HEV antibodies were cross-sectional, we included only cross-sectional studies to conduct the meta-analysis. So far, we are unware of any prospective study comparing seroconversion between the swine workers and the general population.

In fact, this heterogeneity is the reason that there is conflicting conclusions on the prevalence of HEV infection between diverse swine workers groups or between swine workers and the general population. A previous study even identified swine-related occupations as a protective factor (Engle et al., 2002). To overcome limitations and improve the efficiency of the meta-analysis, we further employed subgroup analyses. We determined that in Asia and Europe, and for specific occupations examined, swine This article is protected by copyright. All rights reserved

workers had significantly higher pooled prevalence of anti-HEV IgG compared to the general population, suggesting an increased prevalence of HEV infection. For the subgroup analysis by continent, we concluded that there were relatively more Asian and European studies included in the meta-analysis, leading to a more stable estimate, whereas few studies were conducted in Africa, North America, or South America. Previous studies have revealed that HEV is very endemic in eastern and southeastern Asian countries. In China, HEV prevalence is increasing from a high starting point (Zhu, Liu, Fu, Zhang, & Mao, 2018). Simultaneously, HEV prevalence has become greater in European countries as confirmed hepatitis E cases have increased over 10 fold between 2005 and 2015 (Aspinall et al., 2017). Additionally, the gap in HEV infection between the swine workers and the general population did not vary between Asia and Europe. Traditionally, it is believed that there are different operational procedures in various regions, especially between industrialized countries (such as those in Europe) and resource-limited countries (such as those in Asia), which may result in a disparity in the prevalence of HEV infection through contact with swine. However, in our study, the included studies conducted in five Asian countries (China, Thailand, Japan, Indonesia, and India) and nine European countries (Germany, France, Italy, Norway, Finland, the Netherland, Sweden, Spain, and Moldova) did not differ. Thus, we have evidence that swine workers have substantially increased prevalence of HEV infection, regardless of the socioeconomic circumstances of their country.

For the subgroup analysis by specific swine-related occupation, it was very interesting that all the subgroups gave positive findings in that the swine workers had significantly higher prevalence of anti-HEV IgG compared to the general population. These consistent findings demonstrate that swine workers have substantially increased prevalence of HEV infection, regardless of the specific occupation. Additionally, we found that the gap in HEV infection between the occupation group and the general population did not vary across occupations. Some swine workers such as butchers may be more directly exposed to swine blood and swine farmers may have more contact with swine feces, possibly indicating higher prevalence of HEV infection; This article is protected by copyright. All rights reserved

however, this meta-analysis showed that they had similar PR values compared with meat processors or veterinarians (and the latter is an occupation group who are trained to be careful in self-protection during the examination of animals). In one French study focusing on HEV infection in swine farmers, those who wore gloves had significantly lower prevalence of HEV infection, suggesting self-protection was crucial for the prevention of HEV infection (Chaussade et al., 2013). It is difficult to interpret our findings (the comparison of PR values and 95% CI) that, among all swine-related occupations, pork retailors had slightly lower prevalence of HEV infection and butchers had the highest prevalence. Pork retailors have only routine contact with pork; while butchers have more direct and frequent contact with animals that may carry HEV, and may even be more likely to consume uncooked or undercooked meat (Toyoda et al., 2008). However, the subgroups of meat processors and pork retailers were only examined in one study each, so the results might be not as stable as our estimates for other occupations.

Another way to protect individuals against hepatitis E infection and disease is through vaccination. A hepatitis E vaccine was licensed in China in 2012, and is currently the only hepatitis E vaccine available in any country (Wu, Chen, Lin, Hao, & Liang, 2016). Clinical trials in China have found the vaccine efficacious; at 4.5 years, the vaccine had an efficacy of 86.8% (95% CI: 71%-94%) (Zhang, Shih, & Xia, 2015). Nonetheless, in a position paper released in 2015, the World Health Organization did not issue a broad recommendation for routine vaccination, citing a lack of research outside of China and in certain populations ("Hepatitis E vaccine: WHO position paper, May 2015," 2015). Our analysis suggests that swine workers could be a targeted group for vaccination programs and for future research on the cost-effectiveness of hepatitis E vaccination. Our study examined seropositivity, and not clinical disease, as an outcome, but we can reasonably assume that risk of disease is also higher among swine workers than others in the general population.

In our study, a major limitation is the heterogeneity observed in the pooled prevalence This article is protected by copyright. All rights reserved of both anti-HEV IgG and in the subgroup analyses. This heterogeneity may be partly interpreted by different definitions of swine-related occupations and different operational procedures across regions. Another explanation is differing inclusion criteria for swine workers and the general population across studies. However, the consistency between the findings of original pooled analysis and the subgroup analyses could provide concrete evidence validating our hypothesis. It is also possible that other occupations (like hunters) could be a high risk group, but they were not explicitly considered in this study. Another limitation is that our finding was supported by only the pooled prevalence of anti-HEV IgG.

In summary, swine-related occupations including swine farmers, butchers, meat processors, pork retailors and veterinarians have substantially increased the prevalence of past HEV infection compared to non-swine-related population, suggesting swine workers are more likely to be infected with HEV. However, more evidence focusing on current HEV infection is warranted for further confirmation of zoonotic transmission among swine workers.

Conflict of Interest

The authors declare no conflict of interest.

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Table 1. Search strategies and results

Detabase	Start own	No.	Date of	Date of updated		
Database	Strategy	publications	search	search		
PUBMED	(HEPATITIS E	698	2017.4.8	2018.4.30		
	VIRUS[Title/Abstract]) AND					
	(SWINE[Text Word] OR PIG[Text					
	Word] OR PORCINE[Text Word]					
	OR HOG[Text Word])					

CNKI	(TI='戊型肝炎' OR TI='戊肝') AND	528	2017.4.8	2018.4.30
	(FT='猪')			
OVID	hepatitis e virus.kw,ti,ab. and (swine	761	2017.4.10	2018.4.30
-	or porcine or pig or hog).tw.			
	•			
	<i>J J</i>			
	$\overline{\boldsymbol{\sigma}}$			
- +				

Model	No. studies	PR	95% CI	I^2
Overall IgG	32	1.52	1.38-1.67	71%
Subgroup by continent				
Africa	1	1.59	1.25-2.03	Not applicable
Asia	17	1.49	1.35-1.64	74%
Europe	11	1.93	1.49-2.50	32%
North America	2	0.91	0.43-2.18	91%
South America	1	2.31	0.82-6.46	Not applicable
Subgroup by occupation				
Swine farmers	26	1.51	1.32-1.74	81%
Butchers	5	1.75	1.31-2.35	86%
Meat processors	1	1.46	1.13-1.89	Not applicable
Pork retailers	2	1.19	1.09-1.29	0%
Veterinarians	6	1.36	1.15-1.61	14%

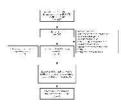
Table 2. Overall and subgroup analysis of anti-HEV IgG with random effects



Figure Legends

- Fig.1 Flow chart of the meta-analysis.
- Fig.2 Overall analysis of anti-HEV IgG prevalence.
- Fig.3 Subgroup analysis of anti-HEV IgG prevalence stratified by continent.
- Fig.4 Subgroup analysis of anti-HEV IgG prevalence stratified by occupation.





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	Occu	peticu	C	ion trol				Weight	Weight
Study	Positive	Total	Positive	Total	Risk Ratio	PR	96% CI	(Random)	(Flood)
1999 Xiang-Ilh Mang	11	2.31	. 7	31	1	1.83	[1.52 2.46]	3 750	3.55
2001 Jan Drebeniue	105	204	63	255	in the second seco		11.62 2.04		3.2%
2002 X J Meno	73			200	÷		[1.09 192]		3.25
2002 R. F. F. F. g.c.	58	GC.5		733			[0.45 0.93]		
2003 Yingje Zheng	259	240	212	425	0		11.35 1 091		
2006 SJOLEN CLISEN	15			103			[0.66 3:00]	- 250	
2006 LJ Y H	31			513	+		[0.01 1 37]		
2007 LCXG	352		246	990	di la		11.31 1 091		
2007 Nong C S	102			73			[0.95 1.63]		2.5%
2007 Ys Yan	413			2239	10		1.24 1.54		19.3%
2008 M. SOLWARDET	~ 2		1 19	319	1		[1.59 14 55]		0.15
2008 Carolina Callana	10	101	4	37			[1 61 12 93]		
2009 G. Masia	3	120	20	432	+ 4		10.14 1.4		3.5%
2009 Yuamua Yu	311			3994	201		[1.57, 1.97]		11/18
2000 Zhong E 8	125			315	F 2		[1:36 2:16]		3.3%
2009 Shap 1 11	.39	182	· E	102	4		0.76 2.26		1.3%
2011 Roseria Midek	32			233	4		[125 162]		
2011 Takako Utsumi	15			177			[1.02 3 30]		
2012 And Krumbholz	ر ن			113	100		11.06 5.07		
2012 Samina Manana Transinda Siya				113			0.82 8.48]		
2013 S. Hripe	39	171	75	342			[0.71 138]		2.7%
2010 Jian Te Lee	13	166	26	311			[1.74 3 80]		
2014 April Koursky L	15		E	237			[0 77 4 98]		
2014 Huanbin Lanc	- 35	114	72	193			10.96 1 001		2.9%
2015 Kuan Abdoulage Tilapré	78	100	43	90	5		[1.25, 2.03]		
2016 G. Ceniso	4	60	8 - H	73			[C 48 .36 03]		3.35
2016 Up Gabala L		83	3	173	60 B		10.07 6 401		3.1%
2016 Wu Y	13	41	165	2185		1/9	[0.86 231]	2.5%	3.8%
2017 H. LANGE	34	126	162	1233			[1.46 2.78]		
2017 Yuan Huar Kang	37	116	121	333			11.81 0 11		2.3%
2013 June A	1	21	7	135			0.06 3.90]		
2018 Wa H Z	103	139	*41	233	-		[n.cc 1 30]		5.4%
Fixed effect model		7835		17127	1	1.52	[1.45; 1.58]	194	100.0%
Random offects model				- 1997 (Fr. 1997)	S 1 2	1.62	[1.38; 1.67]		
- clorogeneity: 2* = 71 & 2* = 0.0362; z = 0.3)				1 1 1				
					31 0512 13				

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Study	Occup Positive		C Positive	ontrol Total	Risk Ratio	PR	e e	5% CI	Weight (Random)	
continent = africa					3					
2015 Rust Abcoulave Tracké	73	100	45	90	*	1.59	C 25	2.06]	4 450	2 3%
Fixed effect model		100		50	4			2.038		2.3%
Random effects model						1.63	[1.26]	2.931	4,4%	0.000
solver the test with a provided										
continent = asia					-					
1999 Xlang-Jin Weng	11	11	37	31	1000	1 80	[32	2 46]	2 75.	3.55
2006 Yingjie Zhang	259	340		425	14			1.69	5.8%	9.6%
2006 DU Y H	31	-1-1	390	319	· 🔫			1.57]	4.850	2.8%
2007 Lin X G	352	786		833	12			1.60]	5.7%	
2007 Nong C S	102	100		79	191			1.65		2.5%
2007 Ya Yen	415	1280		2239	면		-	154]	5 8%	19.3%
2009 Yuanhua Yu	311	086	716	3994				1.97]	5.8%	14.4%
2009 Zheng MiS	123	298		318	1 A A			2 10]		3.8%
2009 Shao HW	33	182	16	132	12			2.26]	2.5	1 0%
2011 Roser o Vivek	32	34		200				1 62]	5.6%	2.0%
2011 Takako Utaumi	13	.76	20	177				3.59]	1.8%	3.8%
2013 & Hejoy	33	171	- 79	347	1.12			1.56]	3 5%	2 75
2015 Jian je Lee 2014 Huanon Lisna	49	166	36	314	1.5		1.2.2.1.2.2.2	3 60	2.0%	1.2%
2014 H3810F L1918	55	114	73	193	1.45.7			1.66]	1.2%	2.8%
2017 Yuan Huan Kang	57	41		300	1012			2.51]		0.95
2017 Year Hoan Kang 2018 Wu H Z	103	159	141	230	1.1			159]	5.5%	5.4%
Fixed effect model	195	4862		12796	12		-	1.57	0.0.0	84.0%
Random effects model		3999.6		1.67.30	2			1.64	73.0%	19.0.5
L'elerogenete F = 24%, C = 0.0200, 3 × 0.0					- T-	1.412	10.00	1.045	10.00	
Celefona, elér a					1					
continent = euroce										
2001 Jan Erobanius	135	264	63	255		2.07	P 62	264]	4.450	3 3%
2000 BJO, KN GLGEN	15	115		139				3.00	1.2%	3.5%
2008 MI GOUWHINEGT	2	49	11	349				14 55]	0.8%	2.15
2006 Gardina Getana	11	101	- ii	37				12 93]	C 75.	3.25
2009 G. Masia	3	130	20	432	* E			1.04)	0.8%	3.5%
2012 Andi Kicin bhoiz	30	106	18	118				3.07]	2.5	3.8%
2014 And Krumbholz	15	302	6	237				4 96]	0.9%	3.3%
2016 C. Caruso	4	09	8	13				36.90	0.2%	0.0%
2016 De Sabajo I	1	83	3	173		0.65	[C C7	6.46]	0.250	3.1%
2017 H. LANGE	34	125	162	1233		2.01	C .46	278]	2.6%	1.6%
2016 Love A	1.	21	17	195	34 J.L.	0.55	10.08,	390	6.2%	3.2%
Fixed effact model		1365		5501	· 4-	1,93	[1:64]	2,291		7.7%
Random effects model	1				1994 1994	1,93	TI 49;	2.501	14.8%	1.1.1.1
1 eterogeneite, 1 = 1214, 1 = 3 C-52, 0 = C.14	4				1					
continent - north america		1225	100	10		0	- 20	7222	1.22	1923
2002 X. J. Meng	73	286	S 73	100			-	1.90]	1.0%	3.2%
2002 R. E. Engli	-53	603	35	233				0.93]	3.05	2.5%
Fixed offect model		899		020		10 million (100	min 1 4 m	1,36}		6.7%
Kandom whet's presta					~~~~	0.907	10.433	5.105	7.056	2. 25
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continent + south accerica										
2012 Sabrina Monteire Tesondin da Silva	70	3.0	S - 54	113		2 34	m 87	6.46]	0.7%	3.35
Fixed effect model		310		110	L.			0.401	1.1 m	0.3%
Random s-Tenta Intelai		3.00		1.10			10110-0110	8.461	0.75	84.44 (M
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2005 Zheng Y J 158 2.2 3.19 51.2 1.2 1.2 1.2 1.3 1.17 1.16 1.17 1.16 1.17 1.16 1.17 1.16 1.17 1.16 1.17 1.16 1.17 1.17 1.16 1.17	occupation - por retailer											
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2002 4. h. bryc 99 003 0.3 200 1 0.80 (0.40 0.90) 2.8% 2.5% 2005 Zhangy V 1 31 45 516 115 10 138 1.41 (0.66 0.00) 1.2% 0.2% 2.8% 2.5% 2005 SLIO FN CEISEN 15 115 10 138 1.41 (0.66 0.00) 1.2% 0.2% 2.8% 2							<u> </u>					
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2006 E.O. FIN CEREM 15 1.6 10 128 1.44 0.00 3.69 3.69 2005 U.Y. 1 3 44 390 319 1.12 0.51 1.27 2.85 2005 U.X. 30 382 382 786 167 533 1.38 1.38 1.38 1.38 1.38 1.38 1.38 1.38 1.38 1.38 1.38 1.38 1.38 1.33 1.44 1.96 3.65 2.25 <td< td=""><td></td><td></td><td></td><td></td><td></td><td>1</td><td></td><td></td><td></td><td> A</td><td></td><td></td></td<>						1				A		
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2005 Carcinz Gatera 19 101 4 97 4.55 f (.51 12.95) $U.78$, 0.25 , 0.25 2006 G. Mesia 3 100 20 2.02 0.43 [0.14, 1.64] 0.85, 0.55 , 0.55 , 0.25 2006 G. Mesia 3 100 20 2.02 0.43 [0.14, 1.64] 0.85, 0.55 , $0.$	10 Y 1 T 1 Y 1 T 1 T 1 T 1 T 1 T 1 T 1 T 1					1.000	6C					
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$\begin{array}{c c c c c c c c c c c c c c c c c c c $		25	182	16	132	68					1.7%	1.0%
2011 Takabo Usunt 2 2 2 42 2012 Ard Kambridz 33 10 16 118 2012 Ard Kambridz 33 177 79 342 2013 Filiping 33 177 79 342 2014 Takabo Usunt 2012 Ard Kambridz 33 177 79 342 2015 Filiping 33 177 79 342 33 131 245 258 245 258 333 127 243 247 162 243 247 163 243 247 163 243 247 163 250 258 295 335 123 244 123 163 265 253 253 245 123 235 295 335 123 245 123 235 235 123 245 123 235 123 245 123 235 123 245 133 245 123 235 123 245 134 245 124 125 125 125 125 125 125 125 <td>2011 Rosar o Wivek</td> <td>23</td> <td>34</td> <td>21</td> <td>100</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>2.350</td> <td>0.5%</td>	2011 Rosar o Wivek	23	34	21	100						2.350	0.5%
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	2011 Takako Usumi	2	2	2	42						0.3%	3.0%
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	2012 And Kitumbholz	33	100	16	115				700 ON		2.0%	3.3%
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	2013.5 Hirjóy	39	171	79	342	+		0.99	0.71	1.58]	2.8%	2 8%
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	2013 Jan-To Lee	45	156	36	314	13		2.57	[.74	3 80]	2.5%	1.25
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	2014 Huanoin Liang	55	114	74	193	19		1.23	[C.67;	100	3.3%	2.9%
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	2016 C. Cenjec	6	69	65 (H	73		10- 10-	- 4.23	10.48	36.95]	0.250	3.0%
$\begin{array}{cccccccccccccccccccccccccccccccccccc$		10	4	175	559			1.21	[C.7C:	1.93]	2.2%	1.0%
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	2017 Year-Huan Kang	57	116	121	\$30		586	2.44	[1.91,	3.11]	3.4%	2.0%
2016 Wu H Z 23 27 141 233 10141 Fixed effect model 4533 10141 1.39 [1.5:1 166] 3.7% 1.5% Random effects model 10141 4533 10141 1.44 [1.36] 1.7% 1.5% Occupation semicrostice model 10141 10141 1.44 [1.32] 1.45 [1.32] 1.45 [1.32] 1.44 [1.32] 1.5%	2017 H LANGE	24	79	162	1200	3		2 25	[56	3.24]	2 75;	1.0%
Fixed effect model 4533 10141 1.44 [1.36; 1.52] = 51.5% Random effects model 1 effect model 1.51 [1.32; 1.74] 61.5% 1 effect model 73 255 75 400 1.45 [1.61] [1.32; 1.74] 61.5% 0000 X J Meng 73 255 75 400 1.45 [1.61] [1.32; 1.74] 61.5% 2005 Zhong Yill 38 48 319 512 1.45 [1.62] 3.2% 31% 2007 Yan Y S 9 33 515 2209 1.27 [1.68 149] 3.5% 2.7% 2.5% 3.1% 2007 Yan Y S 9 33 515 2209 1.24 [1.27 [1.68 149] 3.5% 2.7% 2.5% 3.1% 2006 M Scill/WMMEDT 5 419 27 543 1.34 [1.5% 0.9% 2.34 [1.27 [1.68 149] 3.5% 2.7% 2017 H, LANGC 10 46 162 1200 5.54 5138 1.38 [1.61] 1.5% 0.5% 1.45 [1.61] 1.5% 2017 H, LANGC 10 46 162 1200 5.54 5138 1.38 [1.161] 1.1% 0.5% 1.38 [1.161] 1.1% 1 effect model 554 5138 1.38 [1.161] 1.1% 0.1% 1.30 [1.16; 1.61] 11.7% 1.30 [1.16; 1.61] 11.7% 1 effect model 6386 21770 1.44 [1.38; 1.60] 100.0% - 1.50 [1.36; 1.65] 100.0% - 1.50 [1.36; 1.65] 100.0% -	2016 Love	1		17	195	10 3		0.55	IC.CE	3.90]	0.2%	3.2%
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