ACADEMIC AND PROFESSIONAL BACKGROUND

Centre for Infectious Disease Epidemiology and Research (CIDER) School of Public Health and Family Medicine

Dr. MIGUEL ANGEL LUQUE FERNANDEZ,
PhD in Public Health and Epidemiology
Post-doct fellow

PRESENTATION

UNIVERSITY OF CAPE TOWN

Education

Prior to 2005 →

Dates 1990 - 1993
Bsc in Health Sciences
University of Granada; Av. de Madrid, 18012 Granada, Spain.
Dates 1997 - 1999
Msc in Obstetric and Reproductive health
University of Granada and Ministery of Health
Dates 2000 - 2004
Bsc and Master in social and cultural Anthropology (MA)
University of Granada; Campus Universitario de Cartuja, 18080 Granada, Spain.

Dates 2005-2006

Master in Public Health & Health management (MPH)
Andalusian Public Health School, Granada, Spain

Dates 2006 to 2007

MSc in Epidemiology and Biostatistics
University Libre Brussels/School of Public Health (ULB/ESP), Route de Lennik 808, Brussels, Belguim.

Dates 2007 to 2009

Field Epidemiology Training Program (FETP) such as EIS –Epidemic Intelligence Service- (CDC, Atlanta). Two years Master program in field epidemiology applied to public health surveillance. Field experience in the National Centre of Epidemiology in Spain with and EPICENTRE. (Teaching experience)

Dates 2006-2010 PhD

European PhD in Public Health and Epidemiology

Three Institutions involved:
School of Public Health, Faculty of Medicine: University Libre de Bruxelles, Belgium.
Faculty of Medicine, University of Granada, Spain
National Centre for Epidemiology, Madrid, Spain

Dissertation Title: Maternal Mortality and Perinatal Outcomes in Spain 1996-2006: A change in the reproductive pattern (6 internationals articles published)

Qualified as Suma Cum Laude.

Available at:
http://hera.ugr.es/tesisugr/18930621.pdf

EPIDEMIOLOGICAL EXPERIENCE:

1. LARGE DATABASE MANAGAMENT AND ANALYSIS

   Discharge database Brussels Hospitals (ICD-10-CM) during 2010

2. FIELD EPIDEMIOLOGY EXPERIENCE IN EUROPE AND AFRICA with MSF AND WHO (GOARN -Global Outbreak Alert & Response Network-) (Since 2003 until now)

   Spain, Central Republican Africa, Democratic Republic of Congo, Tchad, Zimbabwe, Haïti, Gabon, etc.

3. OBSERVATIONAL EPIDEMIOLOGY: I HAVE DESIGNED AND PUBLISHED DESCRIPTIVES, CASE CONTROL AND COHORT STUDIES.

   A dream: To design and develop a CLUSTER RANDOMIZED TRIAL

4. COMPLEX SURVEY DESIGN AND ANALYISIS IN LARGE POPULATIONS

Retrospective mortality survey in Tchad

Vaccination coverage and effectiveness (Measles) in DRC (Published)

5. SPATIAL EPIDEMIOLOGY ANALYSIS: Maternal Mortality and Cholera

(Empirical Bayesian Aproach to model posterior probability of cholera riks by suburbs in Harare, 2009) due to SMR inestability in small areas and the correlation of deaths in the sames areas.

6. OUTBREAK RESEARCH: Cholera and Norovirus

Cholera with MSF in Zimbabwe and WHO (GOARN) in Haïti

Surveillance of acute gastroenteritis among pilgrims following the French way to Santiago de Compostela (contamined water in sources and fountains –Norovirus)

Outbreak research in a Nursing Home: Increased mortaly due to a Norovirus massive outbreak. National Center of Epidemiology in Spain (Balearic Islands)

7. CLINICAL EPIDEMIOLOGY

Analysis of MUAC diagnosis performance, 2009 (MSF)

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Departamento de Medicina Preventiva y Salud Pública

EPIDEMIOLOGICAL ANALYSIS OF THE FERTILITY PATTERN IN SPAIN, 1996-2006: EVOLUTION AND TREND OF THE MATERNAL AND FOETAL MORBI-MORTALITY.

Tesis Doctoral Europea presentada por/ European PhD disertation presented by:

Miguel Ángel Luque Fernández

Dirigida por/ Guided by:
Catedrática Profª. Dra. **Aurora Bueno Cavanillas,**
Departamento de Medicina Preventiva y Salud Pública de la Universidad de Granada, España.

Profª. Dra. **Michèle Dramaix-Wilmet**,
Departamento de Bioestadística de la Escuela de Salud Pública de la Universidad Libre de Bruselas, Bélgica.

Prof. Dr. **Juan de Mata Donado Campos**,
Departamento de Medicina Preventiva y Salud Pública de la Universidad Autónoma de Madrid y responsable académico del Programa de Epidemiología Aplicada de Campo del Centro Nacional de Epidemiología, España.

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Gaceta Sanitaria (IF: 1.2 in 2009)

Miguel Ángel Luque Fernández. **Trends in the risk of late fetal mortality, prematurity and low birth weight associated with advanced maternal age in Spain [1996-2005]**. Gaceta Sanitaria 2008. 22: 5. 396-403.

Objectives:

To describe and analyze trends in fertility, fetal mortality rate, prematurity and prevalence of low birthweight in Spain during 1996-2005.

To analyze the association between advanced maternal age and fertility, fetal mortality rate, prematurity and low birthweight in Spain during 1996-2005.

Methods:

The association of low birthweight, prematurity and stillbirth with maternal age was analyzed using **prevalence ratios** under the assumption of a **binomial probability distribution.** Prevalence ratios and risk ratios were presented as measures of association with their respective 95% confidence intervals. The risk of stillbirth adjusted by age and prematurity was analyzed using **Poisson regression models.**

ORIGINAL

Evolución del riesgo de mortalidad fetal tardía, prematuridad y bajo peso al nacer, asociado a la edad materna avanzada, en España (1996-2005)

Miguel Ángel Luque Fernández
Programa de Epidemiología Aplicada de Campo (PEAC), Centro Nacional de Epidemiología, Instituto de Salud Carlos III, Madrid, España.

(Trends in the risk of late fetal mortality, prematurity and low birth weight associated with advanced maternal age in Spain [1996-2005])

Resumen

Objetivos: Describir la evolución de la fecundidad, la mortalidad fetal tardía, la prematuridad y el bajo peso al nacer, así como su asociación con la edad materna avanzada, en España, durante el período 1996-2005.

Métodos: Estudio ecológico. La prematuridad y el bajo peso en función de la edad materna se analizan mediante tablas de contingencia. La evolución de las tasas de mortalidad fetal tardía se analiza mediante una estandarización directa. El riesgo de mortalidad fetal tardía, ajustado por la edad materna y la prematuridad, se analiza mediante una regresión de Poisson.

Resultados: Las tasas de mortalidad fetal tardía y de fecundidad han aumentado en las mujeres de más de 35 años de edad, sobre todo en las mayores de 45 años. El riesgo de mortalidad fetal tardía es 2,7 veces superior para las mujeres a partir de los 45 años (razón de tasas: 2,7; intervalo de confianza del 95% [IC95%]: 1,8-3,0), con una fracción etiológica de la exposición del 69% (IC95%: 55,2-78,6). La prevalencia de prematuridad y de bajo peso para este mismo grupo es 3 veces superior, con una razón de prevalencias de prematuridad de 2,9 (IC95%: 2,7-3,1) y de bajo peso de 3,1 (IC95%: 2,9-3,3).

Conclusiones: El elevado riesgo de las mujeres de 45 o más años de edad se explica por el aumento de la proporción de embarazos en este grupo de edad. Se requieren nuevos estudios, en el ámbito de la epidemiología perinatal, que analicen el impacto de las técnicas de reproducción asistida en los embarazos a edades avanzadas, así como la dinamización de la puesta en marcha del registro nacional de técnicas de reproducción asistida.

Palabras clave: Edad materna. Mortalidad fetal tardía. Recién nacido de bajo peso. Recién nacido prematuro. Técnicas de reproducción asistida.

Abstract

Objectives: To describe trends in fertility, fetal death rate, prematurity and low birth weight, as well as their association with advanced maternal age, in Spain from 1996 to 2005.

Methods: We performed an ecological study. The association between low birth weight and prematurity with maternal age was analyzed through contingency tables. The pattern of fetal mortality rate was analyzed through direct standardization. To study the risk of late fetal mortality, adjusted by age and prematurity, a Poisson regression model was used.

Results: The rates of fertility and late fetal mortality increased in women aged more than 35 years, especially in women aged more than 45 years. The risk of late fetal mortality was 2.7 times higher in women aged 45 years and above (rate ratio, 2.7; 95%CI: 1.8-3), with an etiological fraction of exposure of 69% (95%CI: 55.2-78.6). The prevalence rate of prematurity and low birth weight was three times higher in this age group, with a prevalence rate of prematurity of 2.9 (95%CI: 2.7-3.1) and of low birth weight of 3.1 (95%CI: 2.9-3.3).

Conclusions: The high risk found in women aged more than 45 years is explained by the increase in the proportion of pregnancies within this age group during the period analyzed. Further studies in perinatal epidemiology that analyze the impact of assisted reproduction techniques in pregnancies in older women are required, as well as a national registry of assisted reproduction techniques.

Key words: Maternal age. Fetal death rate. Low birth weight infant. Premature infant. Assisted reproduction techniques.

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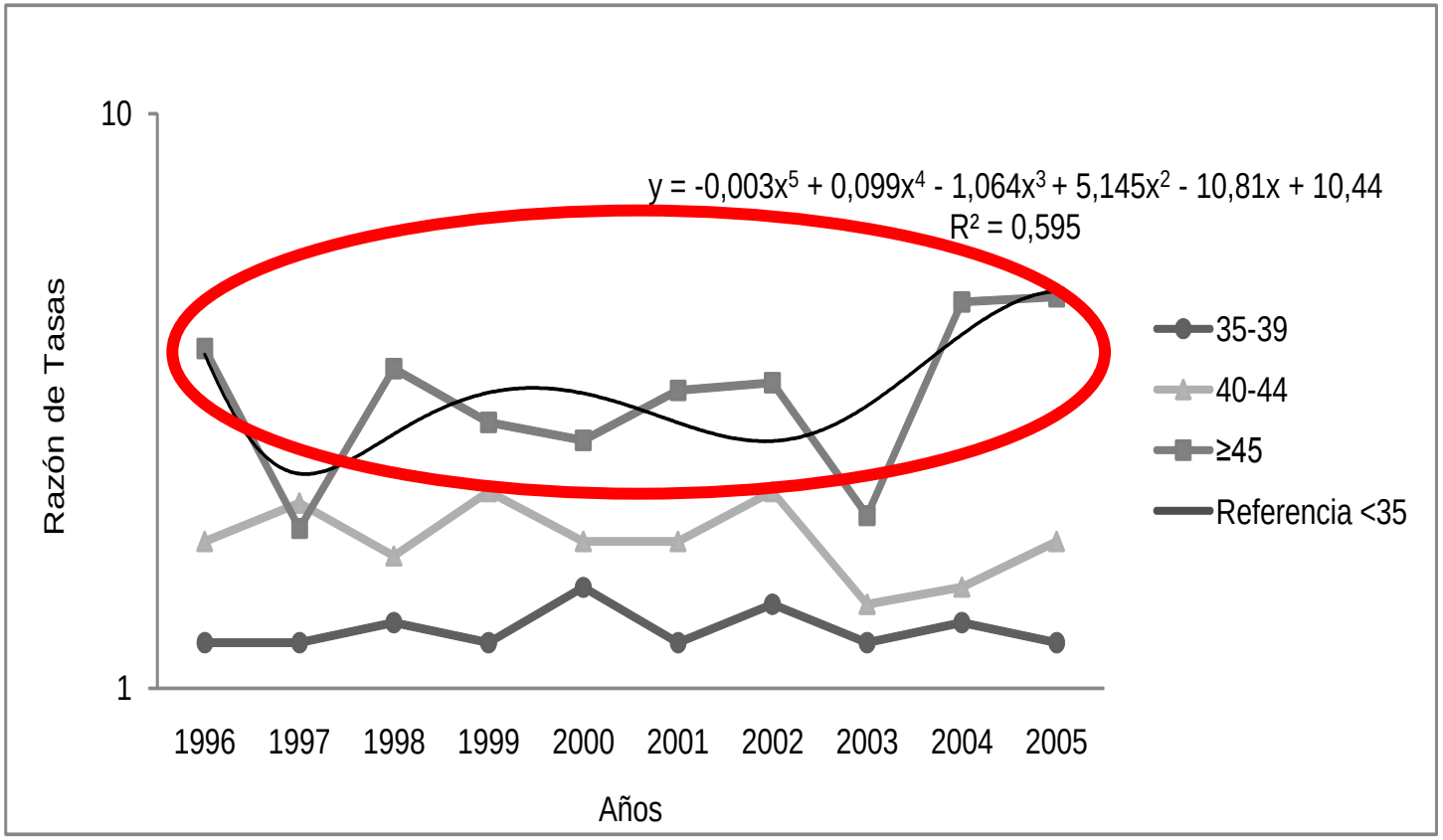
Trend of late foetal death rates ratios by maternal age (reference group women < 35 years) in Spain, 1996-2005.

Figura 1. Evolución anual de la razón de tasas de la mortalidad fetal tardía en función de la edad materna, tomando com referencia el grupo de edad de menores de 35 años, durante el período 1996-2005 en España.



Fuente: INE (Elaboración propia).

Source: Miguel Ángel Luque Fernández. Trends in the risk of late fetal mortality, prematurity and low birth weight associated with advanced maternal age in Spain [1996-2005]. Gaceta Sanitaria 2008. 22: 5. 396-403

EJPH (IF: 2.2 in 2009). Miguel Ángel Luque Fernández, Aurora Bueno Cavanillas, Salvador De Mateo. **Differences in the reproductive pattern and low birthweight by maternal country of origin in Spain, 1996-2006.** European Journal of Public Health. April 12, 2010.

Objectives:

To describe the **prevalence** of low birth weight, pregnancies in women over 35 years of age and multiple pregnancies by mother's country of origin.

To analyze the risk of **low birthweight according to the country of origin** of the mother during 1996-2006 in Spain.

Methods:

A **logistic regression model** was used to analyze the probability of low birth weight by mother's country of origin, and odds ratios were presented as measures of association with their respective 95% confidence intervals.

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European Journal of Public Health, 1–5

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Differences in the reproductive pattern and low birthweight by maternal country of origin in Spain, 1996–2006

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Background: Numerous studies have highlighted poorer reproductive and perinatal health outcomes among migrant mothers in developed countries. Due to the fact that no conclusive data is currently available at national level in Spain, this study aimed to explore potential differences by comparing the prevalence of low and multiple live births and the proportion of live births by maternal age and country of origin during 1996–2006.
Methods: A cross-sectional study was conducted using data from the National Statistics Institute. Low birthweight (LBW) was compared by mothers' country of origin using a logistic regression model. Odds ratios (ORs) and their respective 95% confidence intervals (CIs) are stratified by multiplicity and maternal age.
Results: LBW was associated with a combination of older maternal age and multiple pregnancies in the case of women who had been born in Europe (EU15). However, this association was not found in women who originated from outside the EU15, mostly from countries who have shown significant emigration to Spain during the last decade. LBW was present among all age groups, in both singleton and multiple births, and in particular Romanian mothers showed the highest OR 2.34 (95% CI 1.20–4.80).
Conclusion: This study confirms differences in the reproductive pattern and LBW depending on maternal country of origin. These results allow a better understanding of the reproductive pattern and the implications of mothers' country of origin in LBW. Thus, helping health decisions makers to plan future health interventions aimed at reducing the LBW prevalence in Spain.

Keywords: maternal age, low birthweight, ethnic groups, reproductive health, epidemiology

Introduction

In less than a decade, population of Spain has grown by 13%, climbing from 40 million inhabitants in 1996 to 46 million in 2007; 86% (5.2 million) of this increase is attributable to migration. In 2007, 24% of the foreign population residing in Spain were women of fertile age.[1] These demographic and social shifts have led to a slight increase in overall fertility associated with increased live births prevalence among foreign mothers.[2–4] At international level, several studies have highlighted the worse perinatal and reproductive health outcomes observed in migrant women,[5–8] and specifically the higher prevalence of pregnancies, prematurity and low birthweight (LBW) among adolescent mothers.[9–13] In Spain, only a few studies have addressed this subject from a comparative approach producing contradictory results and based on regional data.[14–17] After arrival to the host country, migrant women undergo a process of adaptation and change which can generate stress. In addition, there are numerous difficulties related to the access to health care services.[9,18,19]

Maternal country of origin, defined as the country of birth of the mother giving birth, is considered by various studies as an indicator for comparative outcomes analysis of perinatal and reproductive health.[10,11]

The LBW prevalence in Spain has increased by 31% during the period 1996–2005, with a prevalence of 7.2% in 2005. This increase has been related to the change of reproductive patterns in Spain, characterized by a higher prevalence of live births among older women.[20] However, the prevalence of LBW by maternal country of origin remained unknown.

Hence, the objectives of this study were to compare the proportion of live births, the prevalence of LBW and multiple live births depending on maternal country of origin and maternal age, as well as to analyse the differences found in Spain during 1996–2006.

Methods

We performed a cross-sectional study. The population in study represented 98.7% (4 484 414 live births) of the total of live births registered in Spain from 1996 to 2006.

Study data were drawn from the National Register of Live Births, part of the Natural Population Movement Statistics

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Risk of low birth weight by maternal country of origin in Spain, 1996-2006. (n= 4,484,414).

	Embarazo simple		Embarazo multiple	
	Edad ≤ 35 años	Edad > 35 años	Edad ≤ 35 años	Edad > 35 años
País de origen materno	OR (IC95%)	OR (IC95)	OR (IC95%)	OR (IC95%)
Marruecos	0,78 (0,75-0,81)	0,79 (0,72-0,86)	0,67 (0,61-0,74)	0,65 (0,54-0,79)
Ecuador	0,91 (0,87-0,95)	1,06 (0,94-1,19)	0,77 (0,66-0,89)	0,74 (0,50-1,11)
Colombia	0,87 (0,82-0,92)	1,00 (0,87-1,15)	1,14 (0,94-1,37)	1,21 (0,58-1,76)
Rumania	1,34 (1,28-1,40)	1,83 (1,50-2,24)	0,92 (0,76-1,12)	2,34 (1,20-4,80)
África Subsahariana	1,36 (1,28-1,44)	1,60 (1,34-1,88)	0,81 (0,68-0,96)	1,06 (0,68-1,53)
China	0,68 (0,62-0,75)	0,88 (0,66-1,18)	0,78 (0,59-1,03)	0,66 (0,29-1,47)
Argentina	0,86 (0,78-0,95)	1,06 (0,86-1,32)	1,15 (0,87-1,51)	0,62 (0,37-1,02)
Reino Unido	1,13 (1,03-1,24)	1,20 (1,02-1,39)	0,98 (0,76-1,26)	1,02 (0,70-1,45)
Bolivia	0,71 (0,64-0,80)	0,78 (0,54-1,20)	0,80 (0,57-1,11)	0,51 (0,19-1,38)
Peru	0,76 (0,68-0,86)	0,99 (0,80-1,22)	0,52 (0,38-0,71)	0,94 (0,55-1,61)
Francia	1,00 (0,90-1,11)	0,89 (0,69-1,14)	0,90 (0,70-1,15)	0,97 (0,60-1,60)
Brasil	1,00 (0,91-1,12)	1,13 (0,85-1,50)	1,32 (0,92-1,87)	1,51 (0,80-2,83)
R. Dominica	1,22 (1,11-1,35)	1,65 (1,30-2,11)	0,83 (0,61-1,12)	0,75 (0,37-1,50)
Portugal	1,24 (1,12-1,34)	1,34 (1,04-1,71)	1,27 (0,95-1,71)	0,58 (0,32-1,03)
Alemania	1,06 (0,95-1,20)	1,05 (0,86-1,23)	0,72 (0,53-0,98)	0,87 (0,53-1,43)
Cuba	0,74 (0,65-0,86)	0,90 (0,61-1,32)	1,02 (0,71-1,45)	1,54 (0,60-4,01)
Italia	0,73 (0,62-0,85)	0,80 (0,60-1,07)	1,09 (0,75-1,60)	1,13 (0,58-1,59)
Polonia	0,89 (0,78-1,01)	1,05 (0,63-1,74)	0,95 (0,62-1,48)	0,66 (0,21-2,05)
Algeria	0,77 (0,66-0,90)	1,01 (0,70-1,46)	0,68 (0,47-0,99)	0,33 (0,12-0,88)
Bulgaria	1,02 (0,90-1,17)	0,83 (0,46-1,48)	1,33 (0,87-2,04)	1,54 (0,40-6,00)
España	1	1	1	1

Fuente: Miguel Ángel Luque Fernández, Aurora Bueno Cavanillas, Salvador De Mateo. Differences in the reproductive pattern and low birthweight by maternal country of origin in Spain, 1996-2006. European Journal of Public Health. Publicado online el 12 abril de 2010.

Gaceta Sanitaria (IF: 1.2 in 2009)

Miguel Ángel Luque Fernández, Aurora Bueno-Cavanillas. **Fertility in Spain, 1996-2006: Foreign versus Spanish women.** Gaceta Sanitaria 2009. 23 (Supl 1): 67–71.

Objective:

To determine fertility trends in Spain and whether women's specific fertility rates differed by age and country of origin during the period of 1996–2006

Methods:

To address the fourth specific research objective, this ecological study of trends compared fertility rates by mother's country of origin using a **direct standardization method**. The fertility rates of foreign women versus Spanish women, adjusted by maternal age and study period, were compared using a **generalized linear model** under the assumption of a Poisson distribution. A **trend analysis** of fertility rates during the study period by mother's age and country of origin was presented using **time plots and linear regression models**.

Original

La fecundidad en España, 1996–2006:
mujeres de nacionalidad extranjera frente a españolas

Miguel Ángel Luque Fernández [a,*] y Aurora Bueno-Cavanillas [b,c,d]

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[b] Departamento de Medicina Preventiva y Salud Pública, Universidad de Granada, España
[c] Servicio de Medicina Preventiva, Hospital Universitario San Cecilio, Servicio Andaluz de Salud, Granada, España
[d] CIBER de Epidemiología y Salud Pública (CIBERESP), España

INFORMACIÓN DEL ARTÍCULO

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Palabras clave:
Dinámica de población
Tendencias
Epidemiología
Embarazo en adolescencia

RESUMEN

Objetivos: Conocer la evolución y la tendencia de la fecundidad en España, así como averiguar si las tasas específicas de fecundidad durante 1996-2006 difieren en función de la edad y la nacionalidad de las mujeres.

Métodos: Estudio transversal de base poblacional. Las tasas de fecundidad se han comparado mediante una estandarización directa; la fecundidad de las mujeres extranjeras frente a la de las españolas, en función de la edad; y el periodo en estudio se ha comparado mediante un modelo lineal generalizado. La tendencia de la serie en función de la nacionalidad se ha descrito mediante gráficos temporales a los cuales se han ajustado modelos de regresión lineal simple.

Resultados: Las mujeres extranjeras han tenido más hijos y a edades más tempranas (índice sintético de fecundidad: 2 frente a 1,2). La creciente tendencia observada en la fecundidad de las mujeres españolas ($p<0,001$) se debe sobre todo al aumento de la fecundidad en edades avanzadas (≥ 35 años). La fecundidad de las mujeres extranjeras frente a las españolas de < 19 años es seis veces superior (razón de tasas: 6,00; intervalo de confianza del 95%: 2,60–13,86).

Conclusiones: El patrón de fecundidad de las mujeres extranjeras es diferente al de las españolas, caracterizado fundamentalmente por una mayor fecundidad, muy acentuada para el grupo de mujeres de < 19 años. Este patrón puede estar asociado a diferencias sociales y culturales. Sería deseable reorientar las políticas de prevención y educación sexual para tener en cuenta las especificidades socioculturales de este grupo de mujeres, y adecuar culturalmente los mensajes de prevención.

Fertility in Spain, 1996–2006: foreign versus spanish women

Keywords:
Population dynamics
Trends
Epidemiology
Pregnancy in adolescence

ABSTRACT

Objectives: To determine fertility trends in Spain and whether women's specific fertility rates differ by age and nationality during the period 1996–2006.

Methods: We performed a population-based, cross-sectional study. Direct standardization was used to compare fertility rates by nationality. Foreign versus Spanish women's fertility rates by age and the period under review were compared by a generalized linear model. The trend by nationality was described by time plots and was analyzed by simple linear regression models.

Results: Foreign women had more children (total fertility rate: 2 versus 1.2) and at younger age. The upward trend observed in the fertility of Spanish women ($p<0.001$) was primarily due to increased fertility in older mothers (35 years and older). The fertility of foreign women aged < 19 was six times higher than that of Spanish women (rate ratio: 6.00, 95% CI: 2.60–13.86).

Conclusions: The fertility pattern of foreign women differs from that of Spanish women and is mainly characterized by higher fertility, especially in younger women (< 19 years). This pattern may be associated with social and cultural differences. Prevention and sexual educational policies should be reformulated to take into account the specific sociocultural characteristics of this group and to adapt prevention messages to their cultural context.

Introducción

En los últimos diez años, España ha experimentado un importante cambio demográfico como consecuencia de la incorporación de importantes efectivos de población extranjera. En poco más de una década la población ha crecido un 13%, pasando de 40 millones de habitantes en 1996 a 46 millones en 2007[1]. De estos 6 millones de habitantes, el 86% (5,2 millones) han sido ciudadanos de nacionalidad extranjera (2,1 millones originarios de países de la Unión Europea). En 2007, el 24% de la población extranjera residente en España eran mujeres en edad fértil (15 a 49 años)[1]. Otro importante aspecto relacionado con este proceso de cambio demográfico y social es el ligero aumento de la fecundidad experimentado en España. En 2006 se alcanzó la cifra de 1,4 hijos de media por mujer en edad reproductiva[1]. A pesar de este aumento, todavía seguimos manteniendo un nivel por debajo

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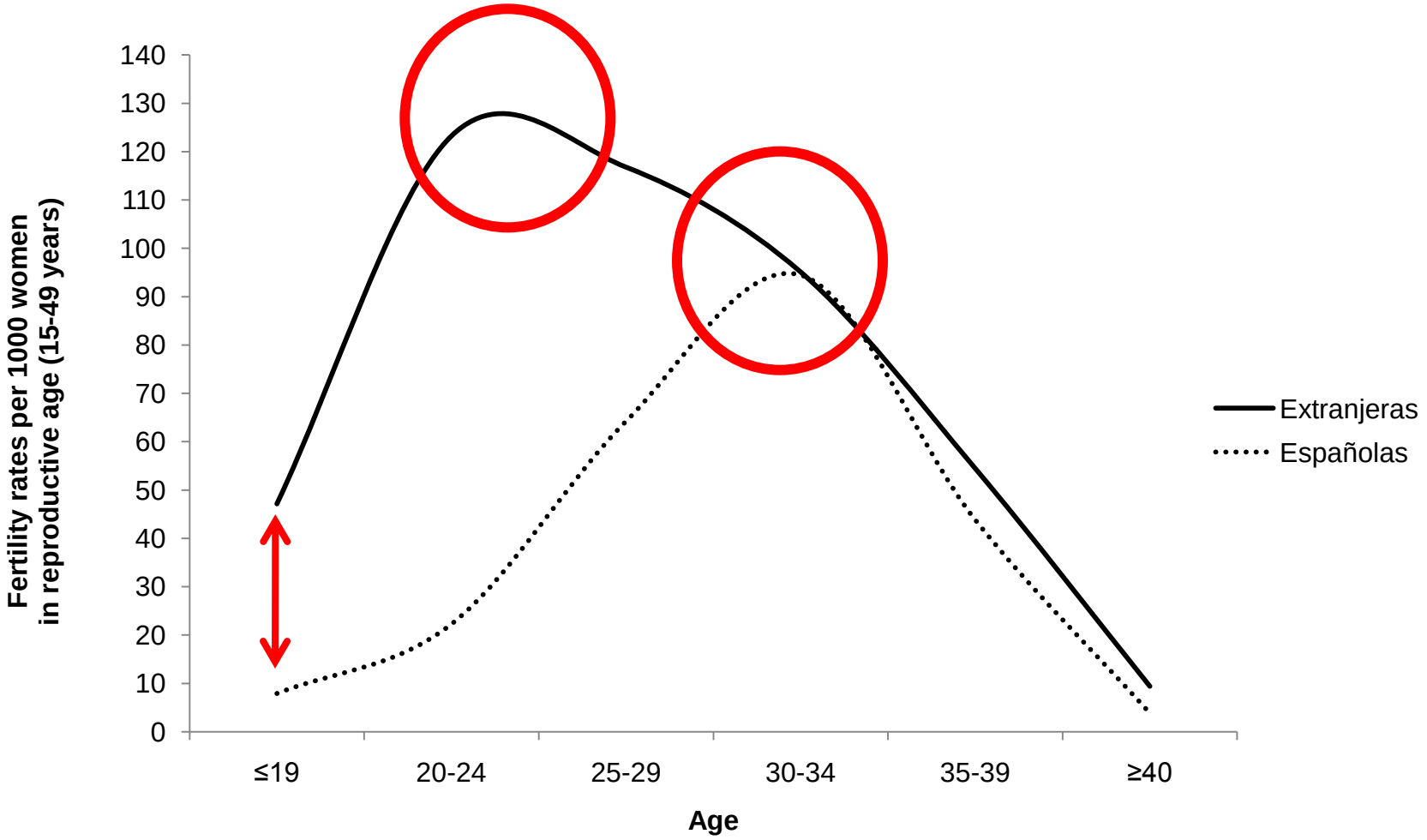
Modellisation of fertility rates by maternal age and country of origin during 1996-2006 (GLM modelling)



Source: Miguel Ángel Luque Fernández, Aurora Bueno-Cavanillas. **Fertility in Spain, 1996-2006: Foreign versus Spanish women.** Gaceta Sanitaria 2009. 23 (Supl 1): 67–71.

Journal of Epidemiology and Community Health IF: 3 in 2009

Miguel Ángel Luque Fernández, Aurora Bueno Cavanillas, Michèle Dramaix-Wilmet, Fernando Simón Soria, Juan Donado Campos, Dionisio Herrera Guibert. **Increase in maternal mortality associated with change in the reproductive pattern in SPAIN: 1996-2005.** Journal of Epidemiology and Community Health 2009; 63:433-438.

Objectives:

To analyze **trend** on maternal mortality ratios in Spain during 1996-2005.

To describe causes of maternal death according to the International Code of Classification of Diseases, tenth version, and related socio-demographic factors.

Methods:

Trends in maternal mortality rates were analyzed using **Poisson regression models** adjusted for age and study period. A descriptive analysis of basic socio-demographic factors associated with maternal mortality was developed for the years with a significant excess of maternal deaths.

Increase in maternal mortality associated with change in the reproductive pattern in Spain: 1996–2005

M Á Luque Fernández,[1] A Bueno Cavanillas,[2] M Dramaix-Wilmet,[3] F S Soria,[1] J de Mata Donado Campos,[1] D H Guibert[1]

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Accepted 8 January 2009

ABSTRACT

Background: In Europe, different studies forecast an increase in maternal mortality in the coming years, associated with advanced maternal age and delay in maternity. This study aims to analyse the age-related trend in the maternal mortality ratio among mothers in Spain for the decade 1996–2005, and to describe the causes of death and associated sociodemographic factors for the years with highest mortality.

Methods: An ecological study on trends, for the age-related trend in the maternal mortality ratio; an indirect standardisation and Poisson regression model was used. For the description of the causes of death, a cross-sectional study was used.

Results: Prevalence of live births among mothers aged 35 years and over was 15% higher in Spain than in Europe. The maternal mortality rate increased by 20% (standardised mortality ratio of 1.2, 95% CI 0.9 to 1.4) in 2005 with respect to 1996. The age-related risk of maternal mortality was three times higher (relative risk of 2.90, 95% CI 2.01 to 4.06) among mothers aged 35–44 years versus those aged under 35 years. The highest mortality was detected during 2003–2004. The risk of maternal mortality was higher in foreign mothers.

Conclusion: This study confirms that there was a change in the maternal mortality trend characterised by an increase in deaths, associated with advanced maternal age, as well as an increase in the prevalence of live births among mothers aged 35 years and over. This change in pattern identifies the need to intensify maternal mortality surveillance by collecting the necessary set of variables that allows investigation of the causes and determinant factors underlying deaths.

In 2006, with a mean of 1.3 children per woman of reproductive age, Spain ranked among the group of countries with the lowest total fertility rates in the world, only ahead of the Ukraine and Greece (among others) with 1.1 and 1.2 children per woman respectively. In the last 20 years, despite the low fertility, the number of pregnancies among women aged over 35 years has been rising progressively, accounting for 21.2% of births in 2006.[1] This important increase in fertility among women aged over 35 years has been accompanied by higher feto-neonatal morbidity and mortality, which becomes extremely marked from age 40 years onwards.[2 3] Similarly, the delay in maternity and the progressive rise in maternal age at date of birth have also resulted in higher female morbidity and mortality. Advanced maternal age has been associated with a higher risk of death[4 5] and an increased risk of delivery by caesarean section during the birth process.[6 7] Maternal mortality is regarded as a preventable cause of death, strongly related to the quality of the healthcare system and economic and social factors.[8–11] The quality of healthcare and maternal care furnished to pregnant women is an element that may account for the differences between states.[12 13] In Spain, a study into the maternal mortality trend for the period 1980–1992 reported a certain stabilisation in the maternal mortality ratio; even so, the authors of this study forecast an increase in maternal mortality for the year 2000, associated with advanced maternal age and delay in maternity.[14] Although this increase has also been forecast for France and England for 2005,[15] there are no comparative analysis data available for the prevalence of pregnancies among women aged 35 years and over in Spain versus Europe, and the maternal mortality trend in Spain needs to be reassessed, as does the impact of advanced age on this trend. Accordingly, this study sought to: compare the prevalence of live births among mothers aged 35 years and over in Spain versus Europe during the last 5 years of the study period, 2000–2005; analyse the age-related trend in the maternal mortality ratio among mothers in Spain for the decade 1996–2005; and describe the causes of death and associated sociodemographic factors for the years with highest mortality.

METHODS

An ecological study on trends, using aggregate data for the maternal mortality trend during the period 1996–2005; and cross-sectional analysis using individual data to ascertain causes of maternal death and associated sociodemographic factors during 2003–2004.

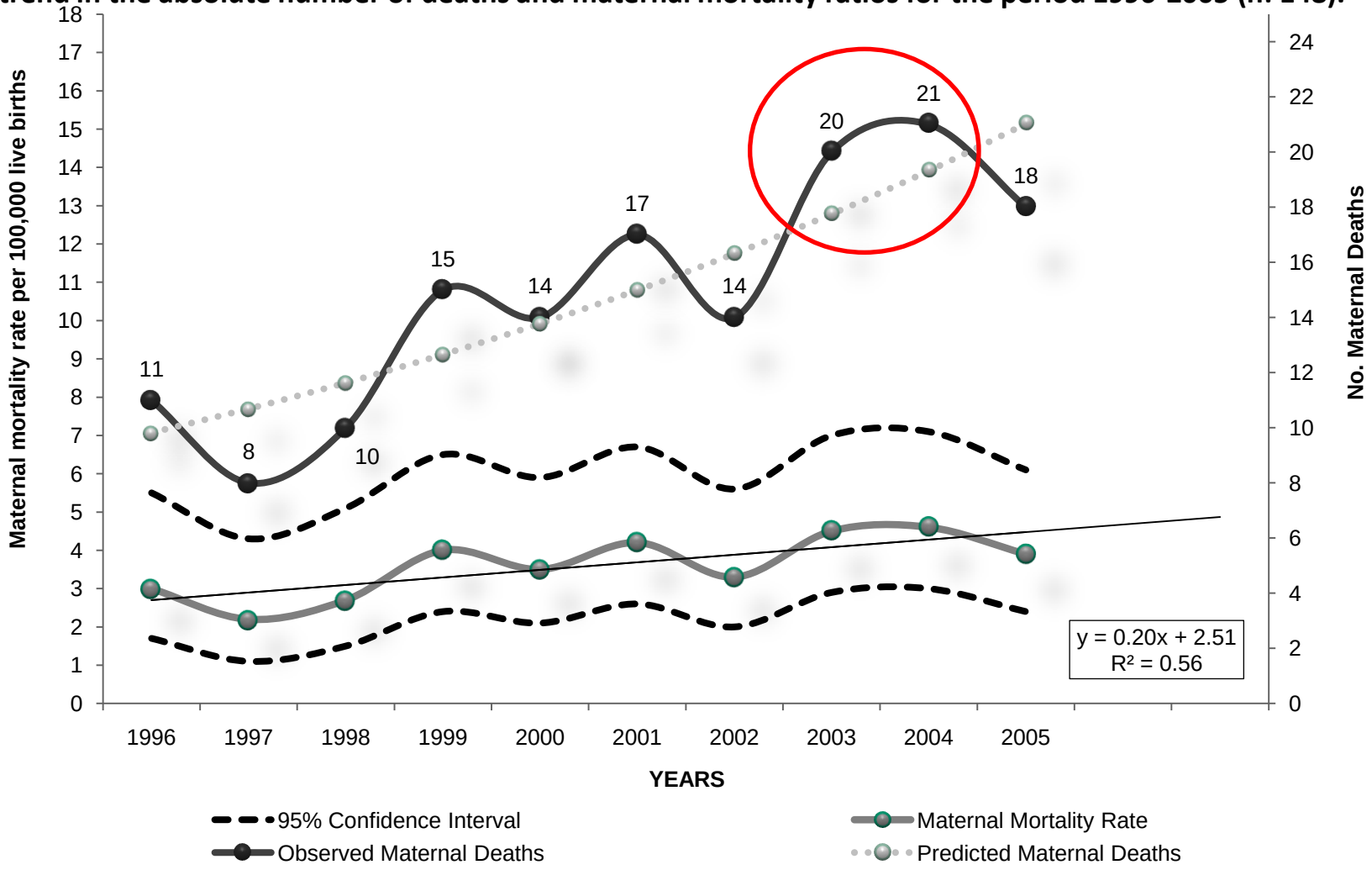
Data source

Data on Europe were drawn from the European Statistics Office (Eurostat). Eurostat calculates the European aggregates on the basis of the data collected from the National Statistical Offices.[16] Data on Spain were drawn from the National Statistics Institute (INE); we used the movement of natural persons (MNP) and death statistics broken down by cause of death.[17]

Description of variables

The total births by mother's age in Europe, for 2000 to 2005 obtained from Eurostat, were used to

Annual trend in the absolute number of deaths and maternal mortality ratios for the period 1996-2005 (n: 148).



Source: Miguel Ángel Luque Fernández, Aurora Bueno Cavanillas, Michèle Dramaix-Wilmet, Fernando Simón Soria, Juan Donado Campos, Dionisio Herrera Guibert. **Increase in maternal mortality associated with change in the reproductive pattern in SPAIN: 1996-2005.** Journal of Epidemiology and Community Health 2009; 63:433-438.

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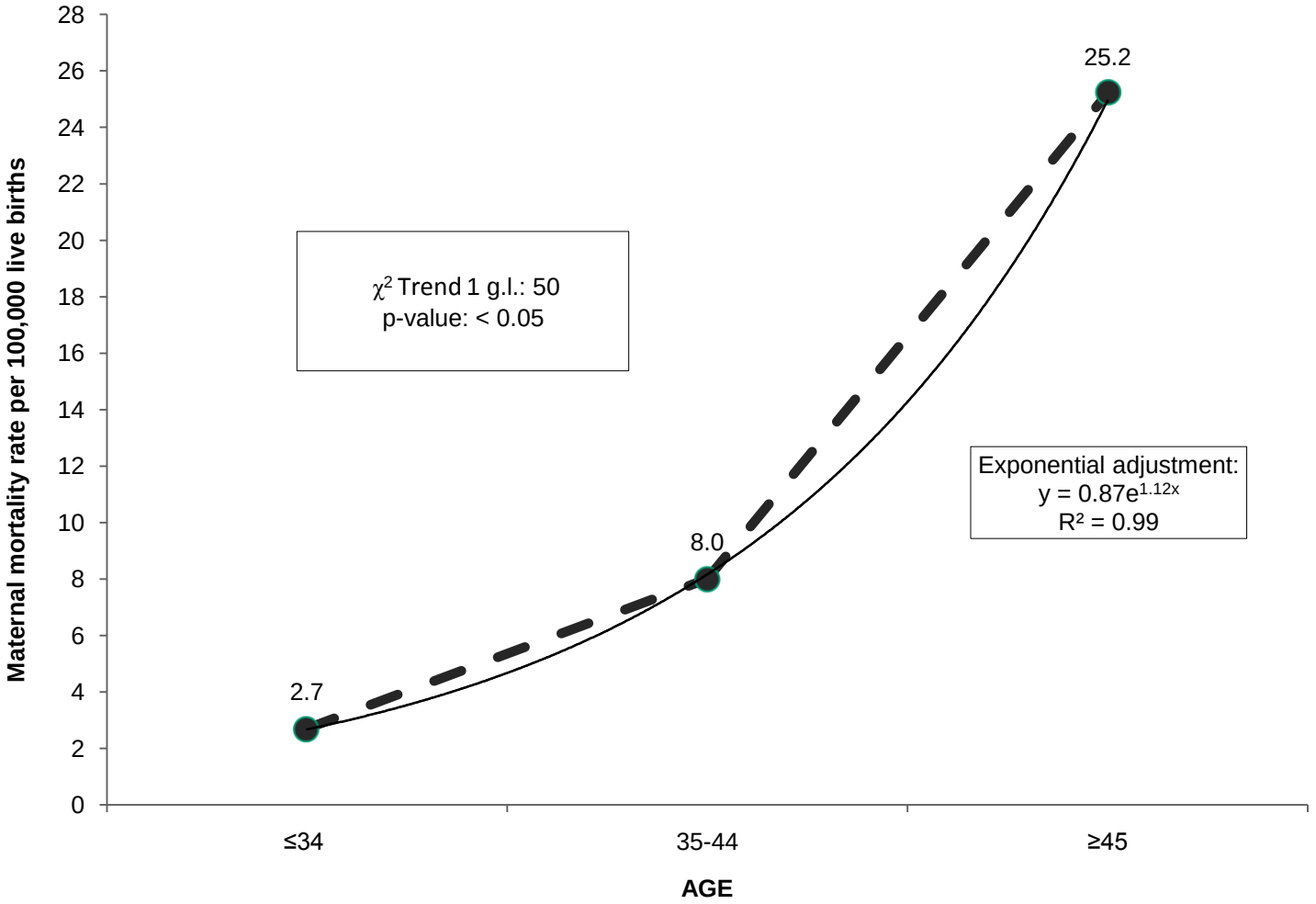
Age-related maternal mortality rate for the period 1996-2005 (n: 148).



Source: Miguel Ángel Luque Fernández, Aurora Bueno Cavanillas, Michèle Dramaix-Wilmet, Fernando Simón Soria, Juan Donado Campos, Dionisio Herrera Guibert. **Increase in maternal mortality associated with change in the reproductive pattern in SPAIN: 1996-2005.** Journal of Epidemiology and Community Health 2009; 63:433-438.

European Journal of Obstetrics & Gynecology and Reproductive Biology. IF: 1.6 in 2009.

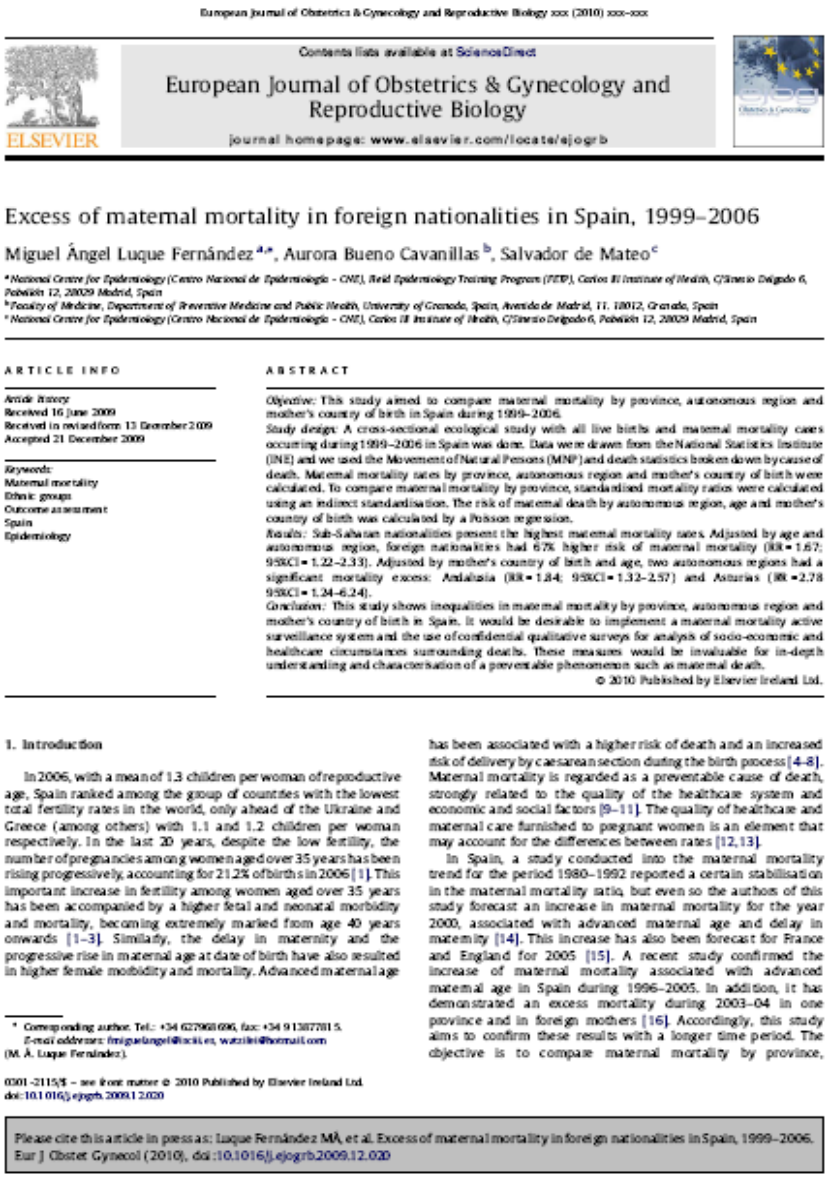
Miguel Ángel Luque Fernández, Aurora Bueno Cavanillas, Salvador De Mateo. **Excess of maternal mortality in foreign nationalities in Spain, 1999-2006.** European Journal of Obstetrics & Gynecology and Reproductive Biology. January, 2010.

Objectives:

To compare maternal mortality risk by **political administrative region** in Spain and **by mother's country of origin** during 1999-2006 at an ecological level (with aggregated data).

Methods:

To compare maternal mortality by province, **standardized mortality ratios** were calculated using an **indirect standardization method**. The risk of maternal death by autonomous region, age and mother's country of origin was calculated using **a Poisson regression**.



European Journal of Obstetrics & Gynecology and Reproductive Biology xxx (2010) xxx–xxx

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Excess of maternal mortality in foreign nationalities in Spain, 1999–2006

Miguel Ángel Luque Fernández [a,*], Aurora Bueno Cavanillas [b], Salvador de Mateo [c]

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Ethnic groups
Outcome assessment
Spain
Epidemiology

ABSTRACT

Objective: This study aimed to compare maternal mortality by province, autonomous region and mother's country of birth in Spain during 1999–2006.
Study design: A cross-sectional ecological study with all live births and maternal mortality cases occurring during 1999–2006 in Spain was done. Data were drawn from the National Statistics Institute (INE) and we used the Movement of Natural Persons (MNP) and death statistics broken down by cause of death. Maternal mortality rates by province, autonomous region and mother's country of birth were calculated. To compare maternal mortality by province, standardized mortality ratios were calculated using an indirect standardisation. The risk of maternal death by autonomous region, age and mother's country of birth was calculated by a Poisson regression.
Results: Sub-Saharan nationalities present the highest maternal mortality rates. Adjusted by age and autonomous region, foreign nationalities had 67% higher risk of maternal mortality (RR = 1.67; 95%CI = 1.22–2.33). Adjusted by mother's country of birth and age, two autonomous regions had a significant mortality excess: Andalusia (RR = 1.84; 95%CI = 1.32–2.57) and Asturias (RR = 2.78 95%CI = 1.24–6.24).
Conclusion: This study shows inequalities in maternal mortality by province, autonomous region and mother's country of birth in Spain. It would be desirable to implement a maternal mortality active surveillance system and the use of confidential qualitative surveys for analysis of socio-economic and healthcare circumstances surrounding deaths. These measures would be invaluable for in-depth understanding and characterisation of a preventable phenomenon such as maternal death.
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1. Introduction

In 2006, with a mean of 1.3 children per woman of reproductive age, Spain ranked among the group of countries with the lowest total fertility rates in the world, only ahead of the Ukraine and Greece (among others) with 1.1 and 1.2 children per woman respectively. In the last 20 years, despite the low fertility, the number of pregnancies among women aged over 35 years has been rising progressively, accounting for 21.2% of births in 2006 [1]. This important increase in fertility among women aged over 35 years has been accompanied by a higher fetal and neonatal morbidity and mortality, becoming extremely marked from age 40 years onwards [1–3]. Similarly, the delay in maternity and the progressive rise in maternal age at date of birth have also resulted in higher female morbidity and mortality. Advanced maternal age has been associated with a higher risk of death and an increased risk of delivery by caesarean section during the birth process [4–8]. Maternal mortality is regarded as a preventable cause of death, strongly related to the quality of the healthcare system and economic and social factors [9–11]. The quality of healthcare and maternal care furnished to pregnant women is an element that may account for the differences between rates [12,13].

In Spain, a study conducted into the maternal mortality trend for the period 1980–1992 reported a certain stabilisation in the maternal mortality ratio, but even so the authors of this study forecast an increase in maternal mortality for the year 2000, associated with advanced maternal age and delay in maternity [14]. This increase has also been forecast for France and England for 2005 [15]. A recent study confirmed the increase of maternal mortality associated with advanced maternal age in Spain during 1996–2005. In addition, it has demonstrated an excess mortality during 2003–04 in one province and in foreign mothers [16]. Accordingly, this study aims to confirm these results with a longer time period. The objective is to compare maternal mortality by province,

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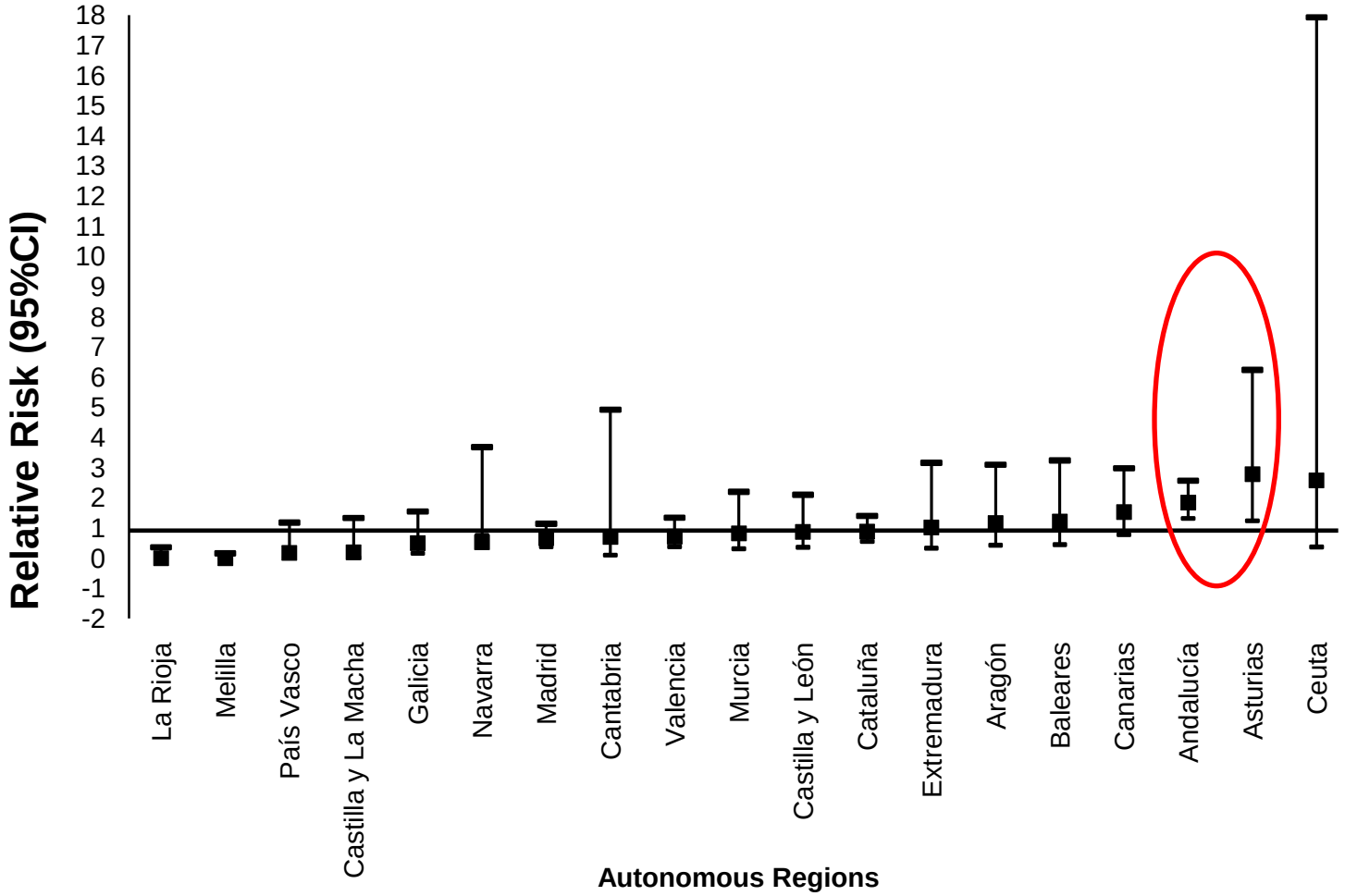
Maternal mortality death risk adjusted by age and geographic regions, 1999-2006, n=133 muertes.



Miguel Ángel Luque Fernández, Aurora Bueno Cavanillas, Salvador De Mateo. **Excess of maternal mortality in foreign nationalities in Spain, 1999-2006.** European Journal of Obstetrics & Gynecology and Reproductive Biology. January, 2010.

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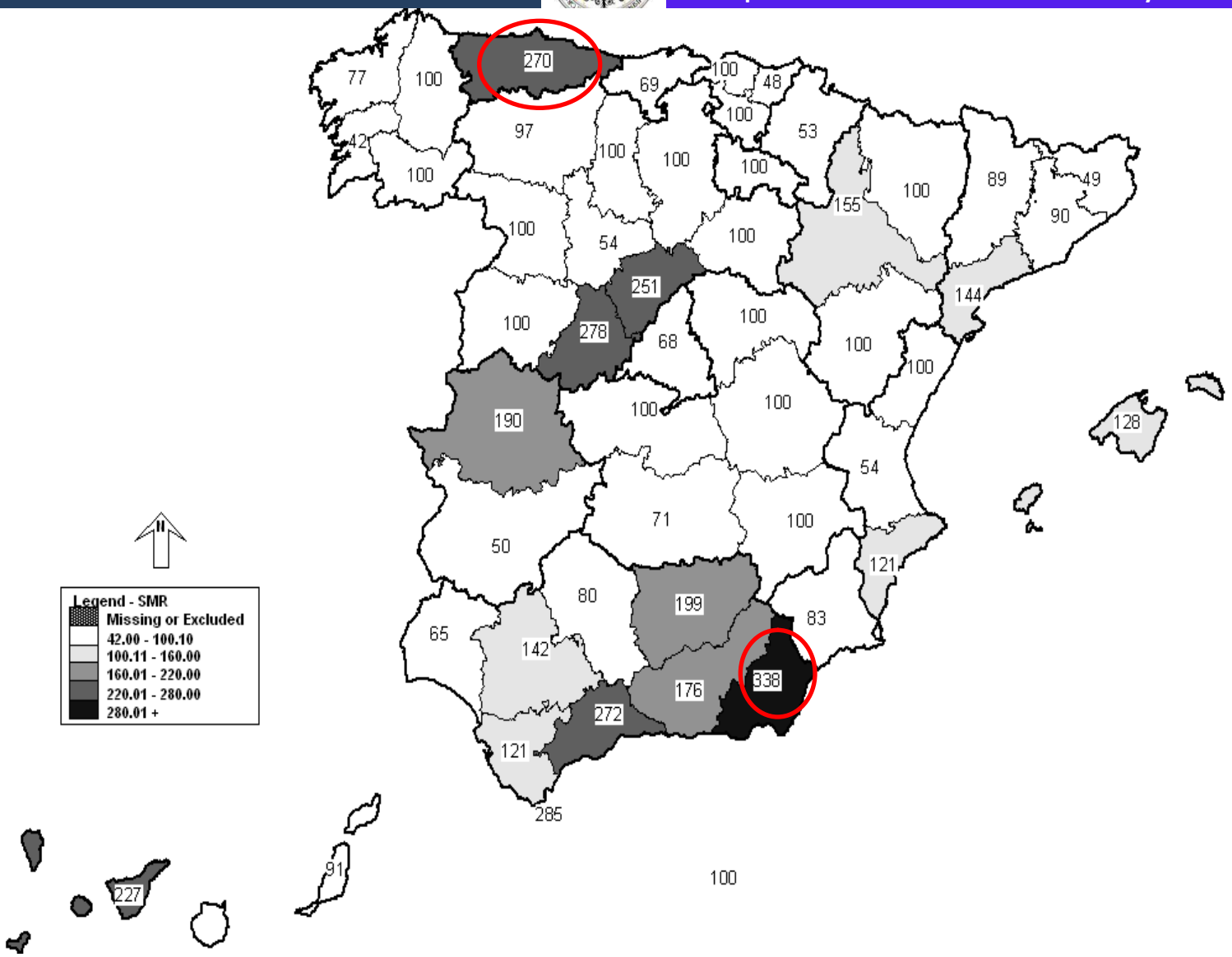

Miguel Ángel Luque Fernández, Aurora Bueno Cavanillas, Salvador De Mateo. **Excess of maternal mortality in foreign nationalities in Spain, 1999-2006.** European Journal of Obstetrics & Gynecology and Reproductive Biology. January, 2010.

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Table 2. Maternal mortality risk ratios by maternal age and nationality adjusted by autonomous region, Spain, 1999-2006 (n: 133 maternal deaths)

	Coefficient (Standard Error)*	RR (95% CI)†	P-value
Foreign vs. Spanish mothers	0.51 (0.17)	1.67 (1.20 to 2.33)	0.002
Maternal Age:			
20 to 29 vs. ≤ 19	0.77 (0.50)	1.60 (0.60 to 4.32)	> 0.05
30 to 39 vs. ≤ 19	0.47 (0.50)	2.20 (0.81 to 5.78)	> 0.05
≥40 vs. ≤ 19	2.25 (0.52)	9.50 (3.43 to 26.31)	< 0.001

67%

*Standard errors scaled using square root of Pearson χ^2-based dispersion.

† Relative Risks adjusted by autonomous regions.

Miguel Ángel Luque Fernández, Aurora Bueno Cavanillas, Salvador De Mateo. **Excess of maternal mortality in foreign nationalities in Spain, 1999-2006.** European Journal of Obstetrics & Gynecology and Reproductive Biology. January, 2010.

European Journal of Public Health, IF: 2.2 in 2009.

Miguel Ángel Luque Fernández, Ignacio Gutiérrez Garitano, Aurora Bueno Cavanillas. **Increased risk of maternal deaths associated with foreign origin in Spain: A population based case-control study.** European Journal of Public Health. June, 2010.

Objective:

To analyze the risk of maternal mortality by mother's country of origin during 1999-2006 in Spain at an individual level (with individual data).

Methods:

Maternal death by mother's country of origin was analyzed using a **matched case-control study.** Each case of maternal death during 1999-2006 was matched with four mothers who had given birth during the same year that the case occurred. Through a **Conditional logistic regression model** matched **odds ratios** were derived with their 95%CI respectively.

The European Journal of Public Health Advance Access published June 21, 2010
European Journal of Public Health, 1–3

doi:10.1093/eurpub/ckp245

Short Report

Increased risk of maternal deaths associated with foreign origin in Spain: a population based case–control study

Miguel Ángel Luque Fernández[1,2], Ignacio Gutiérrez Garitano[2,3], Aurora Bueno Cavanillas[4,5,6]

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3 European Programme for Intervention Epidemiology Training (EPIET), European Centre for Disease Prevention and Control, Stockholm, Sweden
4 Department of Preventive Medicine and Public Health, University of Granada, Avenida de Madrid, Granada, Spain
5 Department of Preventive Medicine, San Cecilio University Teaching Hospital, Andalusian Health Service, Granada, Spain
6 Consortium for Biomedical Research in Epidemiology & Public Health (CIBER Epidemiología y Salud Pública - CIBERESP), Madrid, Spain

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Received 5 September 2009, accepted 29 December 2009

In Europe, different studies have identified immigrant women coming from developing countries as a risk group for maternal death. In Spain, an ecological study showed higher maternal mortality rates among foreign mothers compared with Spanish mothers during 2003–04. To examine whether the maternal death risk among foreign mothers in Spain is increased, we performed a population-based matched case–control study. Each case of maternal death during 1999–2006 was matched with four mothers who had given birth during the same year the case occurred. The National Statistics Institute provided the data. The variables in the study were maternal age and country of origin. We used a conditional logistic regression analysis. Adjusted by age, the risk of maternal death was 87% higher among foreign mothers. This study confirms that there is an increased risk of maternal death among foreign mothers in Spain. It would be desirable to analyse the socio-economic and healthcare circumstances surrounding the deaths.

Keywords: epidemiology, ethnic groups, maternal age, maternal mortality

Introduction

From 1930 through the 1980s, the maternal mortality ratio registered a clear decline in most European countries, with it then remaining stable in the following years.[1,2] In the 1990s, different authors forecasted a rise in the maternal mortality ratio by the beginning of the 21st century, specifically in Europe and related to maternal age and immigration.[3,4] A recent ecological study confirmed a change in the maternal mortality pattern in Spain over the decade, 1996–2005, marked by a rising trend and an increased risk at advanced maternal ages.[5] This study detected a cluster of maternal mortality from 2003 to 2004, where 32% of maternal deaths occurred among foreign

To test whether there was an increased risk of maternal death among foreign mothers, this study aimed to compare the risk of maternal death between foreign and Spanish mothers from 1999 to 2006 in Spain.

Methods

We performed a population-based matched case–control study. Cases and controls were taken from a source population of mothers who were pregnant or had given birth during the study period. All maternal deaths (cases) were drawn from the National Register of Death Statistics and

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Table_1. Maternal mortality risk by age and nationality, Spain 1999-2006 (n = 665, four controls matched to each case by year; 133 matched sets).

		Crude Matched Odds Ratios* (CI95%)	Adjusted Matches Odds Ratios (CI95%)
Maternal Age (in years)			
	≤19	Ref.	Ref.
	20-29	0.82 (0.17-3.92)	0.81 (0.16-3.87)
	30-39	1.15 (0.25-5.41)	1.24 (0.26-5.88)
	≥40	4.31 (0.81-22.92)	4.38 (0.82-23.51)
Maternal Nationality			
	Foreign	1.78 (1.01-3.15)	1.87 (1.04-3.34)
	Spanish	Ref.	Ref.

87%

Miguel Ángel Luque Fernández, Ignacio Gutiérrez Garitano, Aurora Bueno Cavanillas. **Increased risk of maternal deaths associated with foreign origin in Spain: A population based case-control study.** European Journal of Public Health. June, 2010.

Data source: INE, In-house

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Spain witnesses rise in maternal mortality

Tuesday, 7th July 2009

A rise in maternal mortality rates has been seen in Spain since 1996, it has been reported.

Research conducted by the Carlos III Health Institute (ISCIII) in Madrid, published in the Journal of Epidemiology and Community Health, indicates that a 17 per cent increase has been witnessed.

Although mortality rates are still lower than in many other European countries, the data shows that they are increasing.

Miguel Angel Luque, lead author of the study, told SINC that the change, linked to the rise in maternal age, "clearly shows" the need for epidemiological monitoring of maternal mortality.

He added: "This is an avoidable phenomenon, and above all because it shows the importance of studying the

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IVF success higher 'if couples keep trying'

Wednesday, 23rd February 2011
Researchers have found that couples' in-vitro fertilisation (IVF) success is dependent upon the number of cycles the woman undergoes.

Writing in the journal Fertility and Sterility, researchers from the University of Western Australia said IVF success could be improved if couples just keep trying, reports Reuters.

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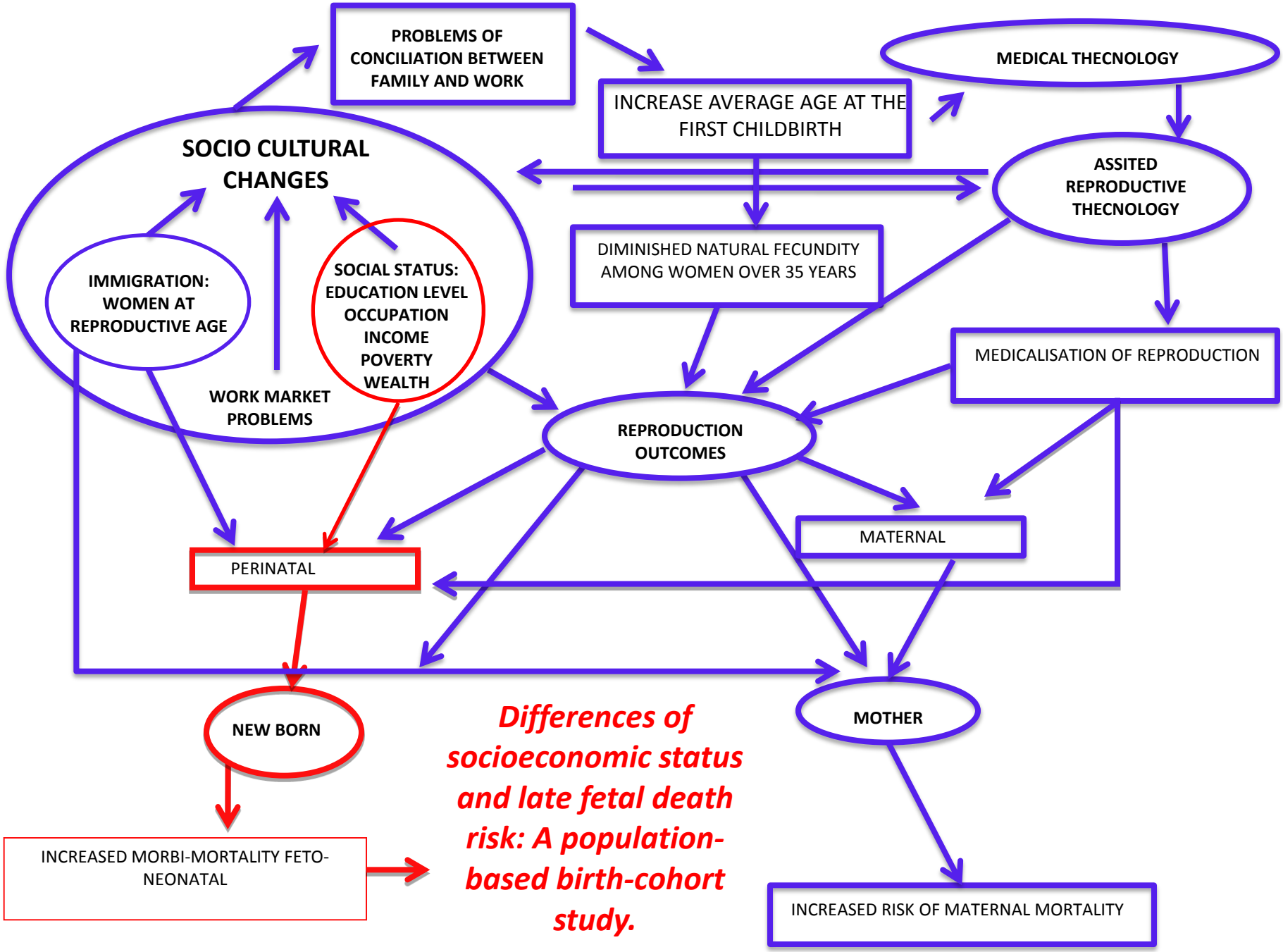
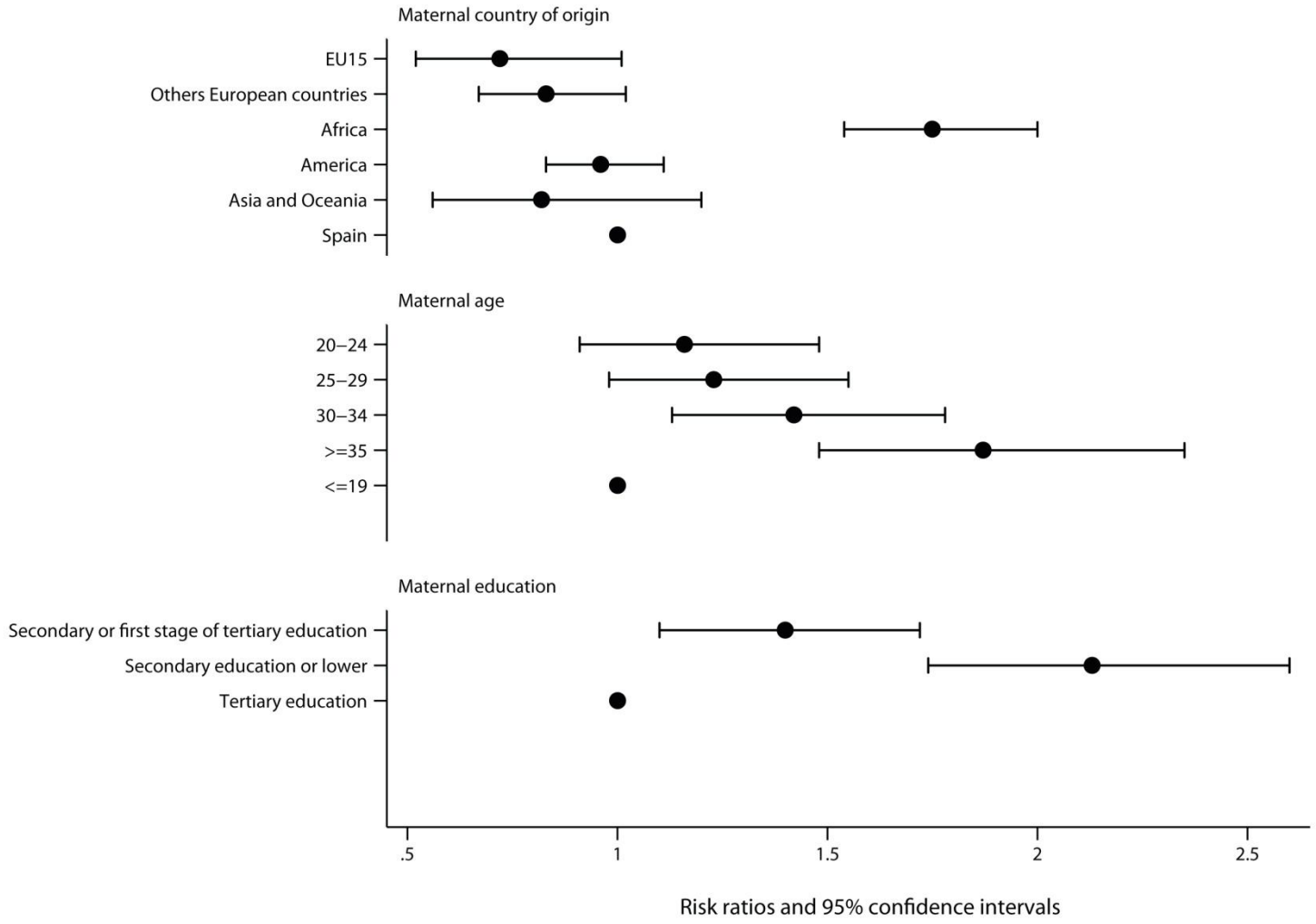

PROBLEMS OF CONCILIATION BETWEEN FAMILY AND WORK
MEDICAL THECNOLOGY
INCREASE AVERAGE AGE AT THE FIRST CHILDBIRTH
SOCIO CULTURAL CHANGES
ASSITED REPRODUCTIVE THECNOLOGY
IMMIGRATION: WOMEN AT REPRODUCTIVE AGE
SOCIAL STATUS: EDUCATION LEVEL OCCUPATION INCOME POVERTY WEALTH
DIMINISHED NATURAL FECUNDITY AMONG WOMEN OVER 35 YEARS
WORK MARKET PROBLEMS
MEDICALISATION OF REPRODUCTION
REPRODUCTION OUTCOMES
MATERNAL
PERINATAL
NEW BORN
MOTHER
INCREASED MORBI-MORTALITY FETO-NEONATAL
Differences of socioeconomic status and late fetal death risk: A population-based birth-cohort study.
INCREASED RISK OF MATERNAL MORTALITY


Maternal country of origin
EU15
Others European countries
Africa
America
Asia and Oceania
Spain
Maternal age
20–24
25–29
30–34
>=35
<=19
Maternal education
Secondary or first stage of tertiary education
Secondary education or lower
Tertiary education
.5
1
1.5
2
2.5
Risk ratios and 95% confidence intervals

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Adjusted stillbirth death risk by maternal country of origin and education in Spain, birth cohort 2007 and 2008.

	Maternal education attainment		
	Tertiary education	Upper secondary education or first stage of tertiary education	Secondary education or lower
Maternal country of origin	Rate Ratio (95%CI)	Rate Ratio (95%CI)	Rate Ratio (95%CI)
Spain	1	1.43 (1.17-1.75)	2.02 (1.60-2.54)
Europea Union of 15 member states	0.77 (0.52-1.00)	1.03 (0.70-1.52)	1.45 (0.97-2.20)
Others european countries	0.81 (0.66-1.00)	1.17 (0.88-1.56)	1.64 (1.21-2.23)
Asia and Oceania	0.81 (0.55-1.17)	1.16 (0.76-1.77)	1.63 (1.06-2.51)
America	0.94 (0.81-1.08)	1.30 (1.05-1.72)	1.89 (1.46-2.50)
Africa	1.71 (1.50-1.96)	2.45 (1.93-3.10)	3.45 (2.70-4.43)

MEDECINS SANS FRONTIERES

Outbreaks research AND Field Epidemiology

Cholera Epidemic in Harare (Zimbabwe), 2008-2009:

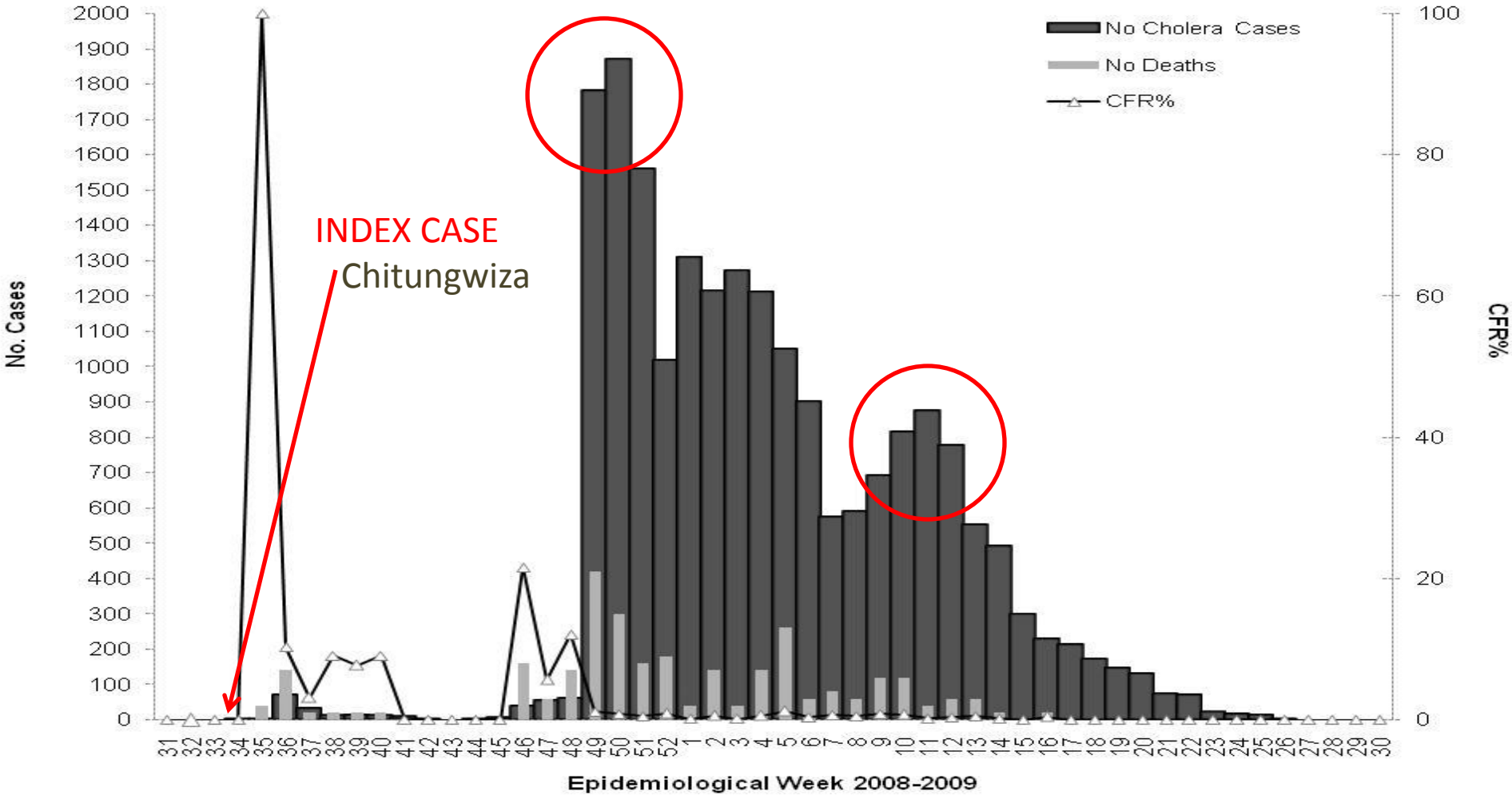
Miguel Ángel Luque Fernández

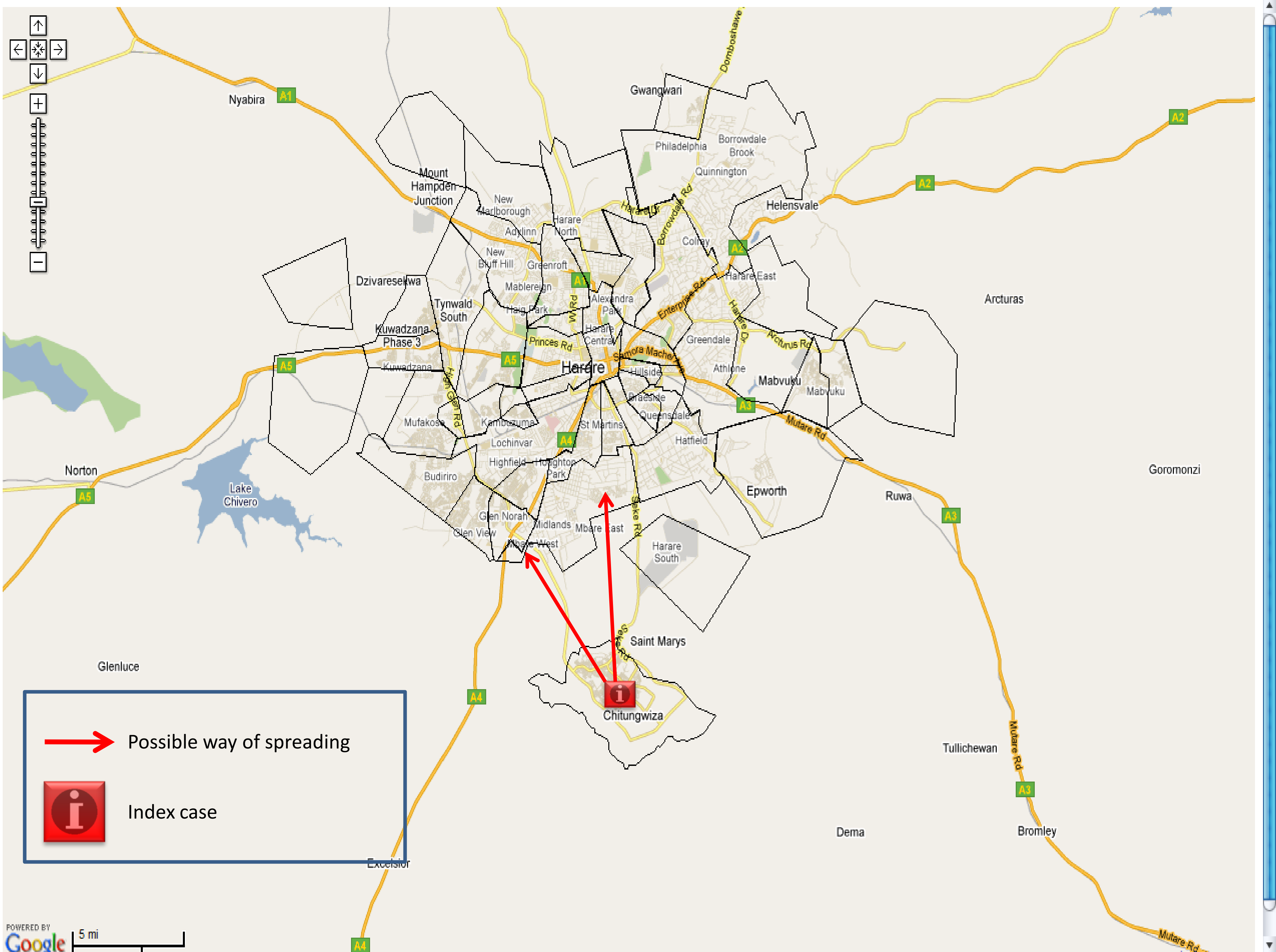
Research Group of Cholera Epidemic in Harare:

Peter Maes, Henry Gray, Ariane Bauernfeind, Patrick Tavernier, Miguel Ángel Luque Fernández.

MSF-OCB-DECEMBER-2009

Epidemic curve of cholera cases in Harare, 2008-09, n= 21,079





Possible way of spreading
Index case
Nyabira
A1
Gwangwari
Domboshawe
Philadelphia
Borrowdale Brook
Quinnington
Helensvale
A2
Mount Hampden Junction
New Marlborough
Harare North
Adylinn
New Bluff Hill
Greencroft
Colray
Harare East
Dzivaresekwa
Mabelreign
Alexandra Park
Enterprise Rd
Arcturas
Tynwald South
Haig Park
Harare Central
Greendale
Arcturus Rd
Kuwadzana Phase 3
Kuwadzana
Princes Rd
Samora Machel
A5
Harare
Hillside
Athlone
Mabvuku
Braeside
Queensdale
A3
Mutare Rd
Mufakose
Kambuzuma
St Martins
Lochinvar
A4
Hatfield
Highfield
Houghton Park
Budiriro
Norton
Epworth
Ruwa
Goromonzi
Lake Chivero
Glen Norah
Glen View
Midlands
Mbare East
Mbare West
Seke Rd
Harare South
Saint Marys
Chitungwiza
Glenluce
Tullichewan
Dema
Bromley
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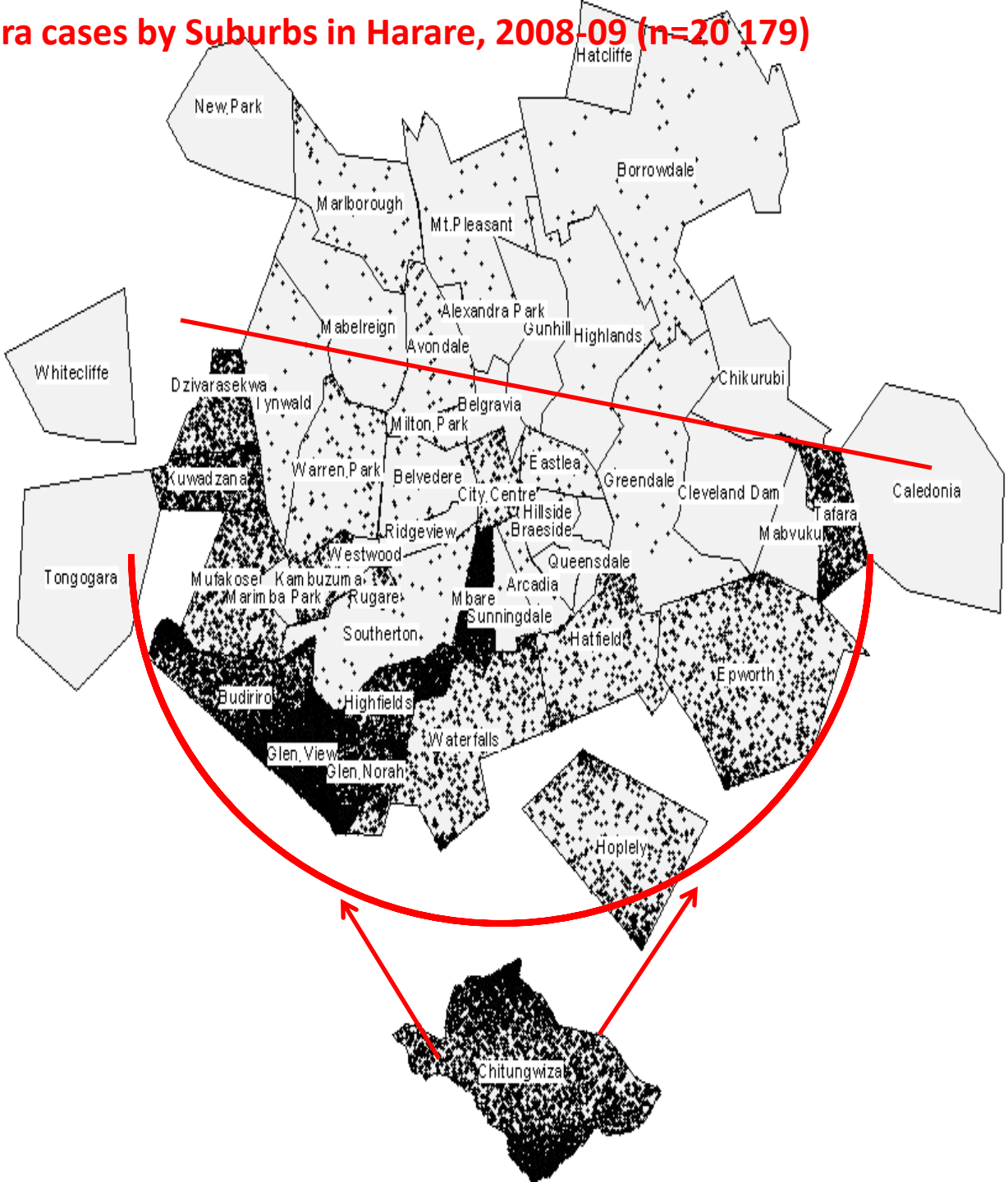
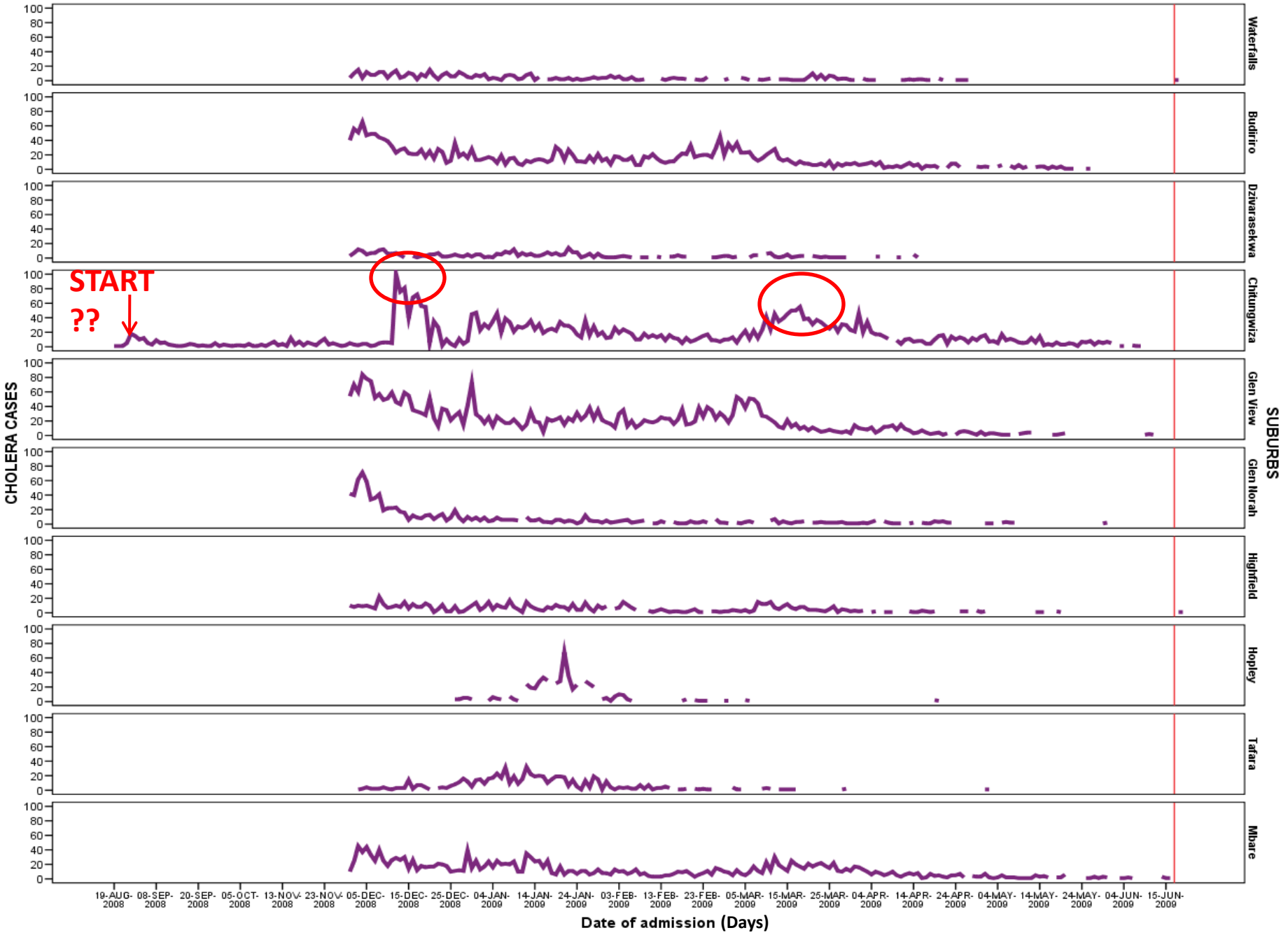
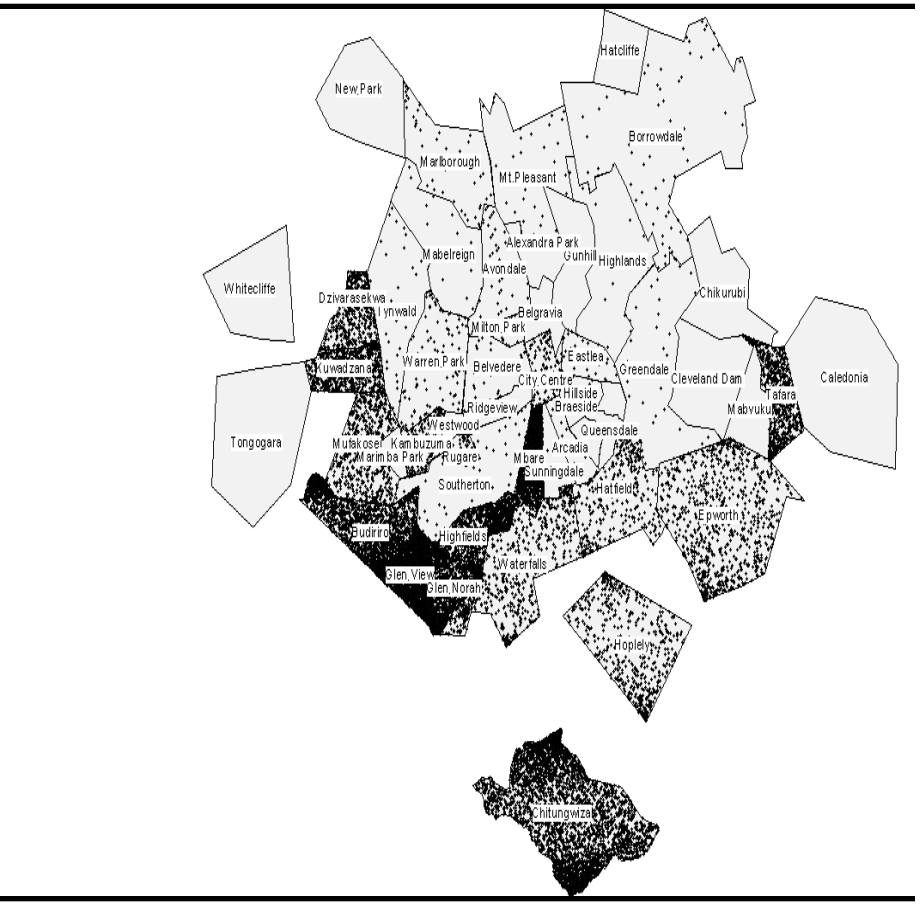
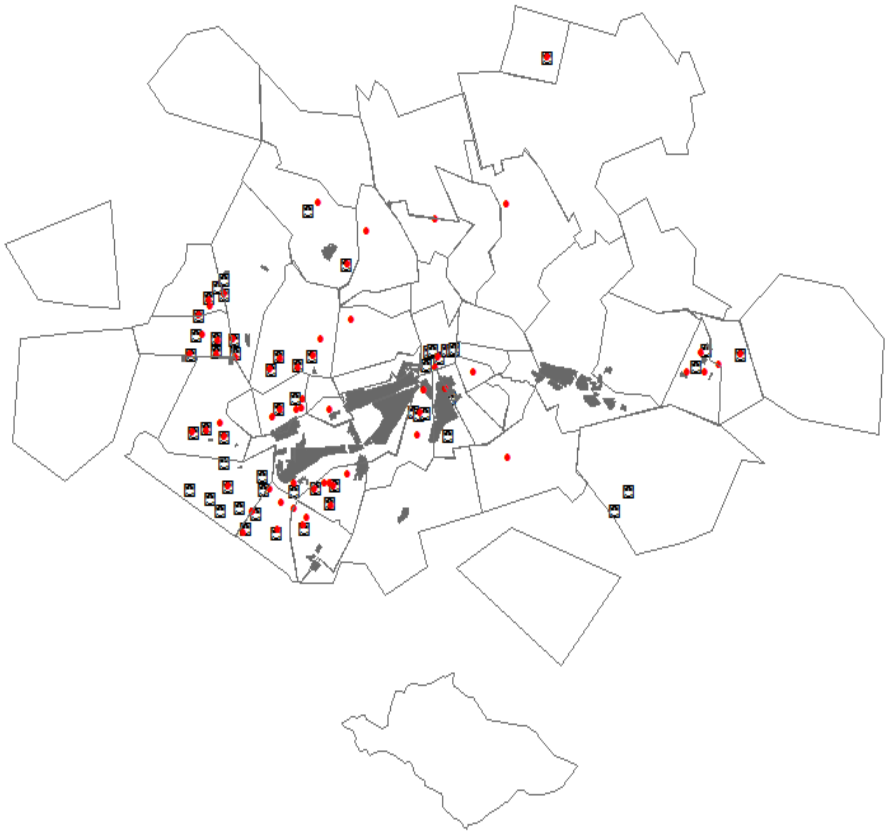
Figuere_2. Cholera cases by Suburbs in Harare, 2008-09 (n=20 179)



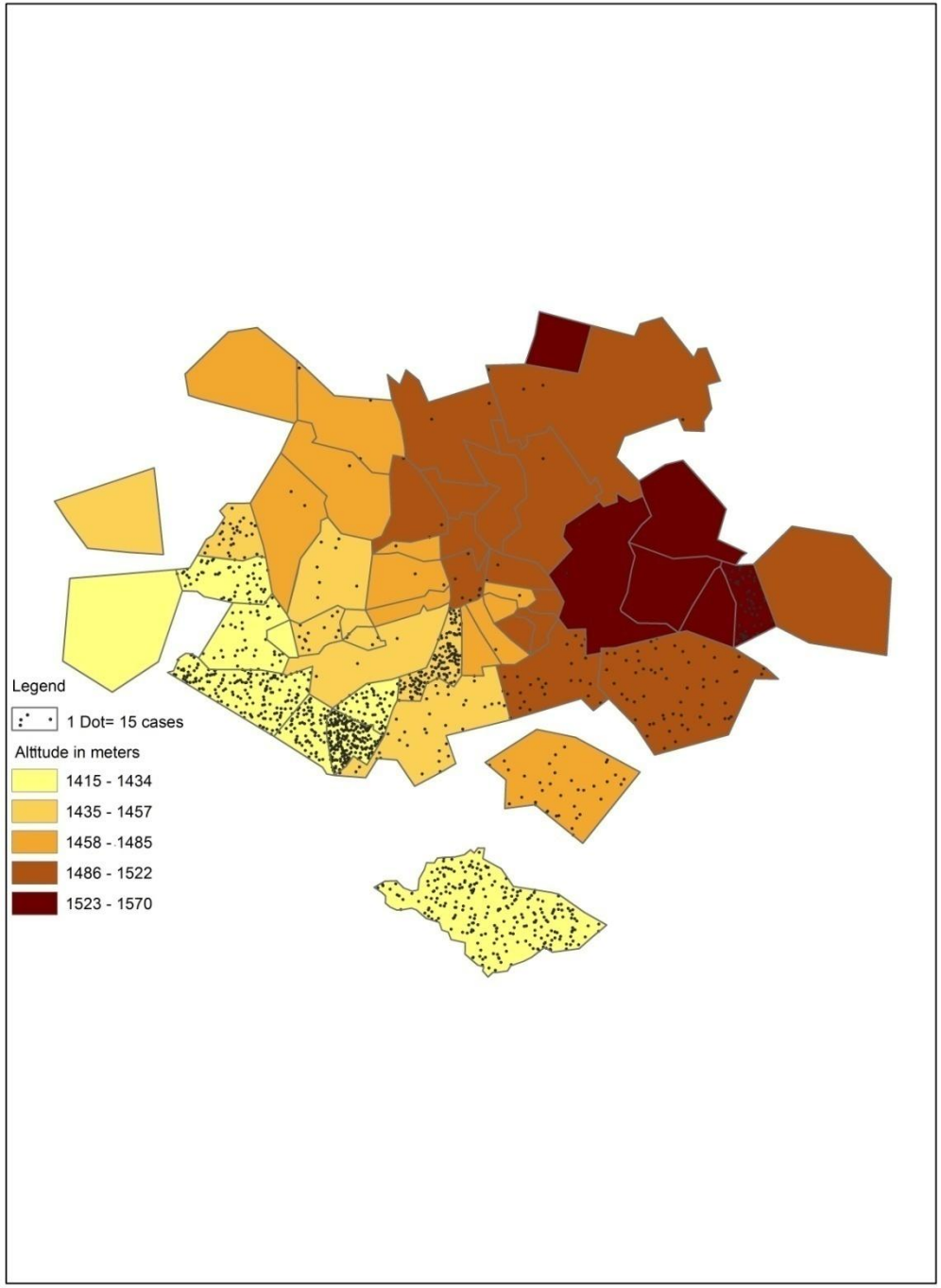
Time plots: Evolution of Cholera cases by Suburbs in Harare, 2008-09 (n=20,179)




Hatcliffe
New Park
Borrowdale
Marlborough
Mt Pleasant
Alexandra Park
Mabelreign
Avondale
Gunhill
Highlands
Whitecliffe
Dzivarasekwa
Chikurubi
Lynwald
Belgravia
Milton Park
Eastlea
Kuwadzana
Warren Park
Belvedere
Greendale
Cleveland Dam
Caledonia
City Centre
Hillside
Tafara
Ridgeview
Braeside
Mabvuku
Westwood
Queensdale
Tongogara
Mufakose
Kambuzuma
Arcadia
Marimba Park
Rugare
Mbare
Sunningdale
Southerton
Hatfield
Epworth
Budiriro
Highfields
Waterfalls
Glen View
Glen Norah
Hopley
Chitungwiza



OTHER INTERESTING THINGS TO LOOK AT IN THE SPATIAL ANALYIS OF INFECTIOUS DISEASES


Legend
1 Dot= 15 cases
Altitude in meters
1415 - 1434
1435 - 1457
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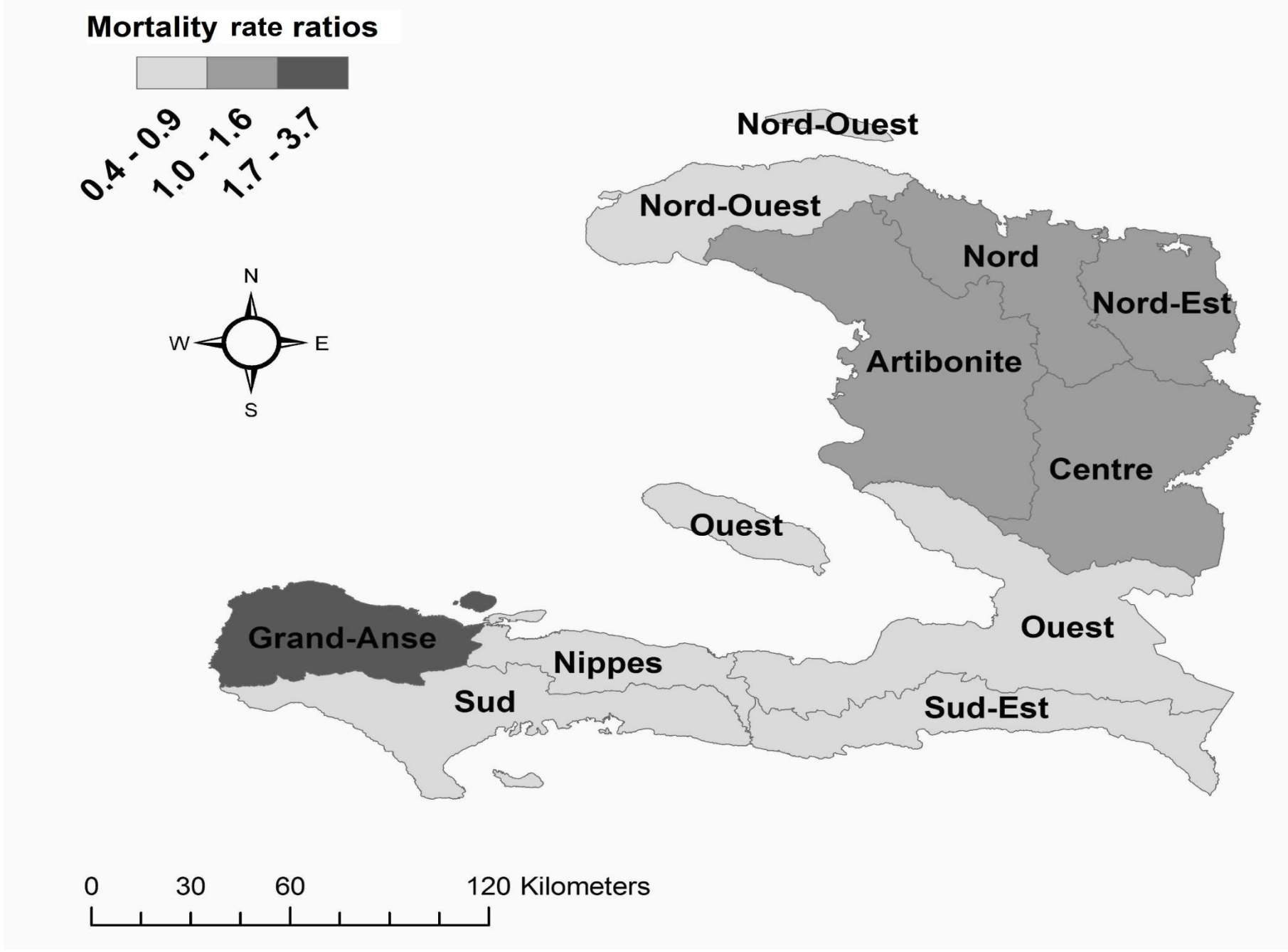
1486 - 1522
1523 - 1570


Mortality rate ratios
0.4 - 0.9
1.0 - 1.6
1.7 - 3.7
N
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E
S
Nord-Ouest
Nord-Ouest
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Grand-Anse
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Sud
Ouest
Sud-Est
0
30
60
120 Kilometers

Transactions of the Royal Society of Tropical Medicine and Hygiene (2009) 103, 137–143

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Influence of temperature and rainfall on the evolution of cholera epidemics in Lusaka, Zambia, 2003–2006: analysis of a time series

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[d] European Programme for Intervention Epidemiology Training (EPIET), Stockholm, Sweden
[e] National Centre of Epidemiology (CNE), Instituto de Salud Carlos III (ISCIII), C/ Sinesio Delgado 6, Pabellón 12, 28029 Madrid, Spain

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Available online 9 September 2008

KEYWORDS
Cholera;
Epidemics;
Climate;
Mathematical modelling;
Zambia;
Africa

Summary In this study, we aimed to describe the evolution of three cholera epidemics that occurred in Lusaka, Zambia, between 2003 and 2006 and to analyse the association between the increase in number of cases and climatic factors. A Poisson autoregressive model controlling for seasonality and trend was built to estimate the association between the increase in the weekly number of cases and weekly means of daily maximum temperature and rainfall. All epidemics showed a seasonal trend coinciding with the rainy season (November to March). A 1 °C rise in temperature 6 weeks before the onset of the outbreak explained 5.2% [relative risk (RR) 1.05, 95% CI 1.04–1.06] of the increase in the number of cholera cases (2003–2006). In addition, a 50 mm increase in rainfall 3 weeks before explained an increase of 2.5% (RR 1.02, 95% CI 1.01–1.04). The attributable risks were 4.9% for temperature and 2.4% for rainfall. If 6 weeks prior to the beginning of the rainy season an increase in temperature is observed followed by an increase in rainfall 3 weeks later, both exceeding expected levels, an increase in the number of cases of cholera within the following 3 weeks could be expected. Our explicative model could contribute to developing a warning signal to reduce the impact of a presumed cholera epidemic.

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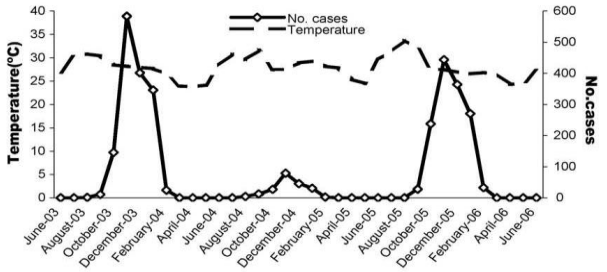

Figure 4 Time plots of number of cholera cases per month and monthly mean temperature (°C) in Lusaka, Zambia, 2003–2006 (Médecins Sans Frontières, unpublished data).

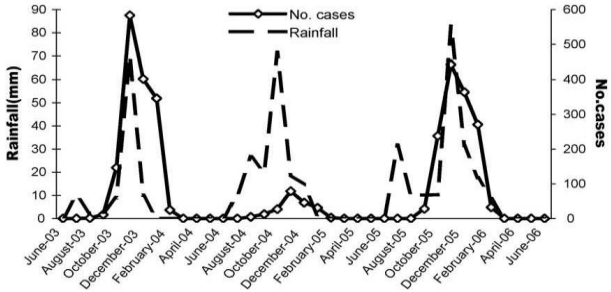

Figure 5 Time plots of number of cholera cases per month and monthly mean rainfall (mm) in Lusaka, Zambia, 2003–2006 (Médecins Sans Frontières, unpublished data).

of the data is due to the high number of null values, the interpretation of the deviance χ^2 is unreliable. Thus, using the simulation approach for evaluating the goodness of fit of sparse data by Boyle et al.[22], the deviance was 5.3 with 142 d.f., the test of goodness of fit of deviance >0.05 and AIC 3.4.

Hence, an ambient temperature increase of 1 °C 6 weeks before the beginning of the outbreaks explained 5.2% of the weekly augmentation of cholera cases observed, and an increase of 50 mm in rainfall 3 weeks earlier explained another 2.5% (Table 2).

4. Discussion

A recent review of WHO cholera incidence and mortality data (1960–2005) raised the question of Africa as a 'new homeland' for cholera.[24] Our results showed recurrent cholera outbreaks in Lusaka, Zambia, within a period of 3 years and characterised by high incidence and CFRs.

The seasonal trend for cholera incidence observed in our time series and coinciding with the rainy season is consistent with what is known for the region.[25,26]

Table 2 Association between the number of cholera cases and climate variables: final autoregressive Poisson model including lags of weekly mean temperature and rainfall (Médecins Sans Frontières, unpublished data)[a]

	Coefficient (SE)[b]	RR (95% CI)	% change[c]	AR (%)	*P*-value
Temperature (6 weeks earlier)	0.05 (0.006)	1.05 (1.04–1.06)	5.2	4.7	<0.001
Rainfall (3 weeks earlier)	0.02 (0.01)	1.02 (1.01–1.04)	2.5	1.9	0.011

RR: relative risk; AR: attributable risk.
[a] Adjusted for seasonality.
[b] Standard errors (SE) scaled using square root of Pearson χ^2 based dispersion.
[c] Percent change in expected count for 1 °C increase in temperature and 50 mm in rainfall.

Jane Olwoch, a senior environmental science lecturer at the University of Pretoria, South Africa, pointed out that besides the biological factors, "Floods caused by heavy rains can contaminate drinking water with the bacterium; in droughts, the bacterium can grow more easily in stagnating water in ponds and rivers."

Researchers in Africa, led by Miguel Ángel Luque Fernández from the Institute of Health Carlos III, based in Madrid, Spain, were the first to show a link between higher temperature and rainfall and the incidence of cholera in Zambia in a study published in the Transactions of the Royal Society of Tropical Medicine and Hygiene, in the UK.

Photo: NOAA

Rita Colwell and colleague Anwar Huq display samples of filtered (left) and unfiltered water. Filtering drinking water helps to remove the zooplankton and reduce cholera by 40 to 50 percent

Cholera outbreaks between 2003 and 2006 in Zambia showed that a one-degree Celsius rise in temperature six weeks before an outbreak began allowed the bacteria to multiply in enhanced conditions, leading to almost 5 percent more cholera cases, while a 50mm increase in rainfall three weeks ahead of an outbreak pushed up the number of cases by more than 2 percent.

A study in South Africa's coastal province of KwaZulu-Natal in 2008, by researchers from the Environmental Change Institute at the UK-based Oxford University Centre for the Environment, found a similar link between warmer sea water, floods, and cholera outbreaks.

"We know there is an indisputable link between cholera and poverty, poor sanitation, quality of drinking water, but there are biological agents involved in cholera that react to changes in climate," Olwoch said.

"We cannot therefore think that we can solve the cholera problem by ignoring these factors, especially now, when we know very well that our climate is changing."

jk/he

Theme (s): Early Warning, Environment, Health & Nutrition, Natural Disasters, Water & Sanitation,

[This report does not necessarily reflect the views of the United Nations]

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KENYA: Food crisis lands government in the dock

COHOR STUDIES: SURVIVAL ANALYSIS

Cohort study of an outbreak of viral gastroenteritis in a nursing home for elderly, Majorca, Spain, February 2008

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2. Epidemiology Service, Council for Health and Consumers, Government of the Balearic Islands, Palma, Spain
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An outbreak of acute gastroenteritis occurred in a nursing home for elderly in Majorca between 4 and 23 February 2008. To know its aetiology and mechanism of transmission a retrospective cohort study was conducted with a fixed cohort including 146 people (96 residents and 50 employees). The data were collected from clinical histories and through a survey by questionnaire. In total 71 cases were identified (53 residents, 18 employees), corresponding to an overall attack rate (AR) of 48.6%. The consumption of tap water, adjusted by age, sex and consumption of meals provided at the nursing home, presented a relative risk (RR) of 4.03 (95%CI, 1.4-11.4). The microbiological analyses confirmed the presence of norovirus and/or rotavirus in five of the seven stool samples submitted. The slow appearance of cases at the beginning of the outbreak is characteristic of a person to person transmission, while the sudden peak in the middle of the month suggests a common source such as the tap water. We therefore concluded that the outbreak likely originated from two sources: an infected employee of the nursing home and the tap water. The high number of dependent residents most probably facilitated the spread of the outbreak.

Introduction

The progressive aging of the Spanish population increases the demand for residential services. The resulting increase of the numbers of nursing homes and their residents has favoured the emergence of acute gastroenteritis outbreaks in these institutions over the past years [1]. Given the risk characteristics of this particular population, these outbreaks are characterised by high morbidity with high attack rates and long duration [2].

Enteropathogenic viruses, including caliciviruses, are the most common causal agents in these outbreaks [3-5]. Rotaviruses are also responsible for severe diarrhoea, but mainly in children [6,7]. Nevertheless, outbreaks of acute gastroenteritis in nursing homes for elderly caused by rotavirus have been described in the literature [8-10].

In Spain, little information is available on morbidity and mortality associated with norovirus infection, its distribution among the population, and many of its epidemiological characteristics. This is primarily due to the fact that sample collection and laboratory screening for noroviruses is not done routinely [11]. Compared to other EU countries, not many studies of gastroenteritis outbreaks caused by norovirus are described in general and in nursing homes in Spain in particular [4, 12-15].

It is estimated that norovirus is the most common cause of acute gastroenteritis in some European Union countries, with 6% and 11% of all intestinal infectious diseases attributed to norovirus in the United Kingdom and the Netherlands, respectively [16,17].

Noroviruses are transmitted primarily through the faecal-oral route, either by direct person-to-person spread or by faecally contaminated food or water. Secondary and tertiary cases appear quickly through a person-to-person transmission. Noroviruses can also spread via a droplet route from vomits [18,19].

In healthcare facilities, transmission can additionally occur through hand transfer of the virus to the oral mucosa via contact with materials, fomites, and environmental surfaces that have been contaminated with either faeces or vomits. These circumstances make it extremely difficult to control outbreaks in institutional settings [20,21].

Between 4 and 23 February an outbreak of acute gastroenteritis occurred in an elderly nursing home in Majorca, Spain. The outbreak was characterised by a slow start followed by an explosive increase in the number of cases which may be linked to a common source. To contain the outbreak, between 9 and 11 February, the nursing home authorities implemented the following control measures: enteric isolation, cleaning of areas contaminated by vomit, restriction of visitors, suspension of the consumption of tap water, distribution of bottled water, cleaning and chlorination of the water cistern, and stool sampling. The notification of a suspected gastroenteritis outbreak was sent to the health authorities of the Balearic Islands on 13 February. In view of the microbiological confirmation of a mixed viral aetiology (norovirus and rotavirus) and the high attack rate, an epidemiological investigation to determine the causes and transmission routes of the outbreak was launched on 5 March.

FIGURE 2

Survival function of the tap water adjusted by age, sex and consumption of meals at the nursing home, outbreak of gastroenteritis in Majorca, February 2008 (n=146, 48.6% cases)

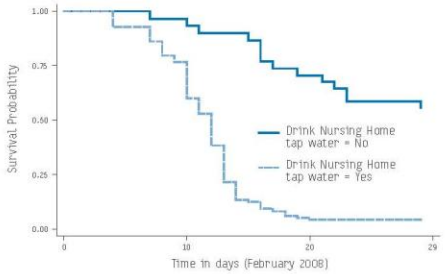

FIGURE 3

Verification of the hypothesis of proportional risks assumption, logarithmic survival curves, Ln(-LnS (t)), outbreak of gastroenteritis in a nursing home for elderly, Majorca, February 2008

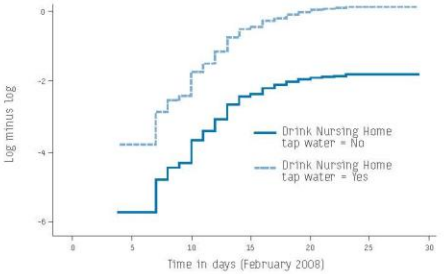

TABLE 3

Univariate analyses of gastroenteritis cases in employees of the nursing home, outbreak in Majorca, February 2008 (n=50)

Variables	Cohort of employees	Cases	Attack rate (%) (95% CI)	Incidence density* (95% CI)	Incidence density ratio (95% CI)	Attributable fraction (exposed) (95% CI)
Sex						**
Female	47	17	36.1 (22.4-58.1)	1.5 (0.9-2.3)	1.1 (0.2-48.5)	13.9 ([-4.5]-97.9)
Male	3	1	33.3 (4.7-23.6)	1.2 (0.2-9.2)	1	
Age in years* **						
≤ 24	8	3	37.5 (12.116.2)	1.5 (0.5-4.8)	1.5 (0.2-1.7)	36.3 ([-37.5]-91.4)
25-34	12	3	25.0 (8.0-77.5)	0.9 (0.3-3.0)	1	
35-44	12	6	50.0 (22.4-111.2)	2.1 (0.9-4.8)	2.1 (0.4-13.5)	54.2 ([-11.4]-92.6)
≥ 45	15	6	40.0 (17.9-89.0)	1.7 (0.7-3.8)	1.7 (0.4-6.9)	43.2 ([-12.2]-85.5)
Job position						
Health workers	38	16	42.1 (25.7-68.7)	1.8 (1.1-2.9)	2.9 (0.7-2.6)	65.7 ([-45.6]-96.1)
Others****	12	2	16.6 (4.1-66.6)	0.6 (0.1-2.4)	1	
Working hours						
Day shift	16	8	50.0 (25.0-99.9)	2.2 (1.1-4.4)	2.3 (0.5-13.4)	56.5 ([-81.2]-92.5)
Afternoon shift	8	3	37.5 (12.0-116.2)	1.6 (0.5-5.0)	1.6 (0.2-12.5)	40.5 ([-34.3]-92.0)
All shifts	3	1	33.3 (4.6-23.6)	1.4 (0.2-10.1)	1.5 (0.1-18.6)	33.0 ([-342.2]-94.6)
Day/night shift	11	3	27.2 (8.7-84.5)	1.1 (0.3-3.4)	1.1 (0.1-8.6)	13.1 ([-54.8]-88.3)
Day/Afternoon shift	12	3	25.0 (8.0-77.5)	0.9 (0.3-2.9)	1	
Length of employment in months						**
11-14 months	10	5	50.0 (20.8-120.1)	2.3 (9.9-57.4)	2.6 (0.5-13.2)	61.2 ([-76.9]-92.4)
7-10 months	11	5	45.4 (18.9-109.2)	2.0 (8.5-49.4)	2.2 (0.5-11.3)	55.7 ([-105.7]-91.2)
4-6 months	12	4	33.3 (12.5-88.8)	1.2 (4.8-34.0)	1.4 (0.3-7.35)	28.7 ([-282.7]-86.7)
0-3 months	17	4	23.5 (8.8-62.6)	0.9 (3.4-24.2)	1	
Location at the workplace (floor and module) in February						**
Ground floor	10	3	30.0 (9.6-93.0)	1.1 (0.3-3.5)	1.4 (0.2-8.2)	28.0 ([-391.7]-87.8)
Second floor, module A	7	2	28.5 (7.1-114.2)	1.1 (0.2-4.3)	1.3 (0.1-9.1)	23.7 ([-743.3]-89.0)
Second floor, module B	6	4	66.6 (25.0-117.6)	4.5 (1.7-12.1)	5.5 (1.0-29.6)	81.8 (2.5-96.6)
Second floor, module C	8	5	62.5 (26.0-150.1)	2.7 (1.1-6.5)	3.3 (0.7-16.6)	69.6 ([-41.0]-93.9)
Both floors	19	4	21.0 (7.9-56.0)	0.8 (0.3-2.1)	1	
Consumption of the nursing home meals in February						**
Yes	9	3	33.3 (10.7-103.3)	1.4 (0.4-4.3)	1	
No	41	15	36.5 (22.0-60.6)	1.5 (0.9-2.5)	1.1 (0.3-5.8)	7.4 ([-227.0]-82.8)
Drinking of the nursing home tap water in February						**0.01**
Yes	5	4	80.0 (30.0-213.1)	6.5 (2.4-17.4)	**5.3 (1.2-17.0)**	**81.3 (0.2-94.1)**
No	45	14	31.1 (18.4-52.5)	1.2 (7.2-20.7)	1	

*Incidence density per 100 people and day
** P value > 0.05 of χ^2 of Fisher's exact test
*** Information on age was available for 47 of the 50 employees in the cohort (three missing)
**** Cleaning, Laundry and maintenance service and administration; (working in administration was not reported by any case)

CLINICAL EPIDEMIOLOGY

MEDECINS SANS FRONTIERES
ARTSEN ZONDER GRENZEN

Accuracy of mid-upper-arm circumference to detecting severe acute malnutrition measured with the new WHO Growth Standards.

Miguel Ángel Luque Fernández

Accuracy of MUAC in the Detection of Severe Wasting With the New WHO Growth Standards

AUTHORS: Miguel Ángel Luque Fernández, MA, MPH, FETP, Pascale Delchevalerie, MSc, and Michel Van Herp, MD, MPH

Medical Department, Brussels Operational Center, Doctors Without Borders, Brussels, Belgium

KEY WORDS
malnutrition, anthropometry, mid-upper-arm circumference, diagnostic errors, epidemiology

ABBREVIATIONS
MUAC—mid-upper-arm circumference
NCHS—National Center for Health Statistics
WHO—World Health Organization
CI—confidence interval

Dr Luque Fernández's current affiliation is the Brussels-Capital Health and Social Observatory, Research Centre for the Joint College Services of the Joint Community Commission, Brussels, Belgium.

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WHAT'S KNOWN ON THIS SUBJECT: MUAC measurements are used to screen rapidly for malnutrition among children 6 to 59 months of age. With the introduction of a new growth curve for children by the WHO in 2006, an evaluation of MUAC diagnostic accuracy is needed.

WHAT THIS STUDY ADDS: This study confirms the need to change the MUAC cutoff value from <110 mm to <115 mm. This change is needed to maintain the same diagnostic accuracy and to identify children at greatest risk of death resulting from severe wasting.

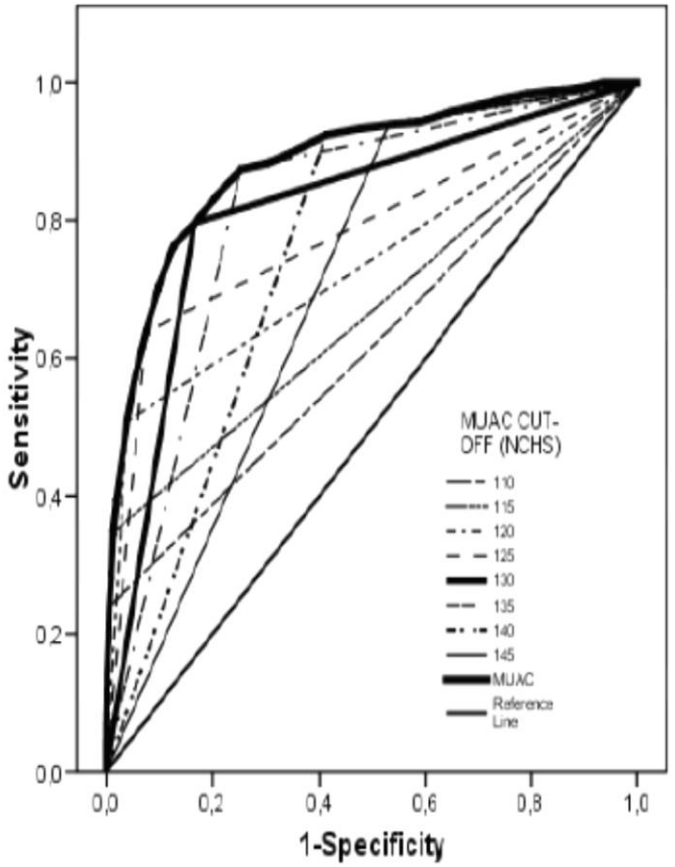
abstract

OBJECTIVES: The objectives of this study were to estimate the accuracy of using mid-upper-arm circumference (MUAC) measurements to diagnose severe wasting by comparing the new standards from the World Health Organization (WHO) with those from the US National Center for Health Statistics (NCHS) and to analyze the age independence of the MUAC cutoff values for both curves.

METHODS: We used cross-sectional anthropometric data for 34 937 children between the ages of 6 and 59 months, from 39 nutritional surveys conducted by Doctors Without Borders. Receiver operating characteristic curves were used to examine the accuracy of MUAC diagnoses. MUAC age independence was analyzed with logistic regression models.

RESULTS: With the new WHO curve, the performance of MUAC measurements, in terms of sensitivity and specificity, deteriorated. With different cutoff values, however, the WHO standards significantly improved the predictive value of MUAC measurements over the NCHS standards. The sensitivity and specificity of MUAC measurements were the most age independent when the WHO curve, rather than the NCHS curve, was used.

CONCLUSIONS: This study confirms the need to change the MUAC cutoff value from <110 mm to <115 mm. This increase of 5 mm produces a large change in sensitivity (from 16% to 25%) with little loss in specificity, improves the probability of diagnosing severe wasting, and reduces false-negative results by 12%. This change is needed to maintain the same diagnostic accuracy as the old curve and to identify the children at greatest risk of death resulting from severe wasting. *Pediatrics* 2010;126:e195–e201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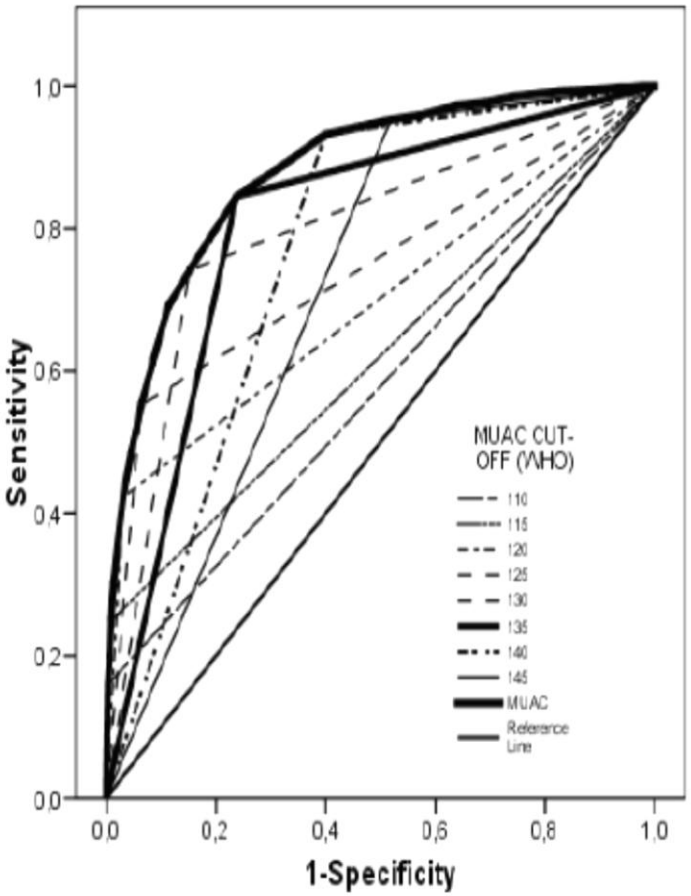
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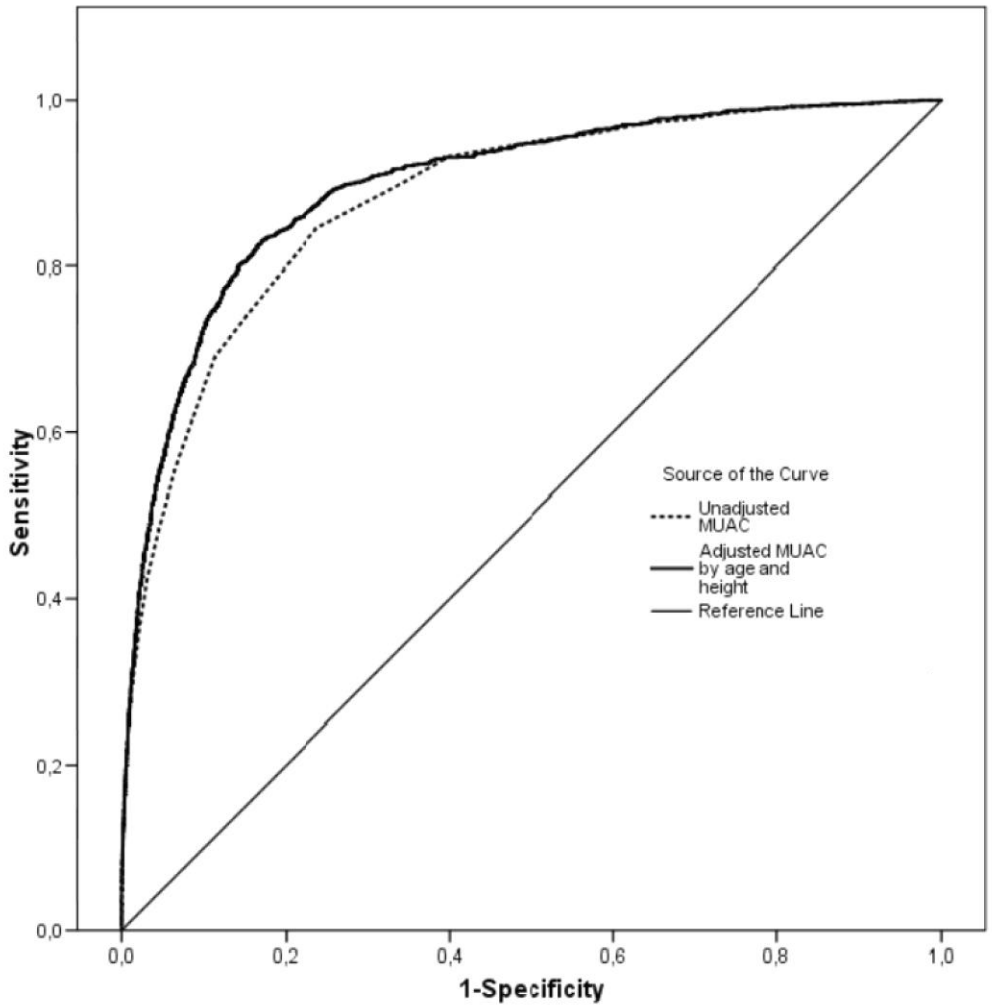
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0,6
0,8
1,0
1-Specificity
Source of the Curve
Unadjusted MUAC
Adjusted MUAC by age and height
Reference Line

COMPLEX SURVEYS

Evaluation quali-quantitative du projet «Agents Paludisme»

Enquête de morbi-mortalité due au paludisme dans le district sanitaire de Bongor (Tchad), avril 2008

Miguel Ángel Luque Fernández
Centre Nationale d'épidémiologie, Madrid (Spain)
C/Sinesio Delgado 6, Pabellón 12.
Programa de Epidemiolgía Aplicada de Campo (PEAC)
Field Epidemiolgy Training Program (FETP)
fmiguelangel@isciii.es

ENQUÊTE DE COUVERTURE VACCINALE: ENFANTS (12 À 59 MOIS) ET FEMMES (15-45 ANS) EN RDC (LUBUTU) 2009

MIGUEL ÁNGEL LUQUE FERNÁNDEZ Bsc (Anthropologyst), MPH, FETP (Epidemiologyst). CENTRO NACIONAL DE EPIDEMIOLOGIA: PEAC (FETP)// EPICENTRE_MSF-OCB_BRUSSELS

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  - Matched Case Contro
  - Screening
- Person Time
  - 1 Rate
  - Compare 2 Rates
- Continuous Variables
  - Mean CI
  - Median/%ile CI
  - t test
  - ANOVA
- Sample Size
  - Proportion
  - Unmatched CC
  - Cohort/RCT
  - Mean Difference
- Power
  - Unmatched CC
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  - Clinical Trial
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Sample Size for Frequency in a Population

Population size(for finite population correction factor or fpc)(*N*):	97000
Hypothesized % frequency of outcome factor in the population (*p*):	50%+/-5
Confidence limits as % of 100(absolute +/- %)(*d*):	5%
Design effect (for cluster surveys-*DEFF*):	2

MEDECINS SANS FRONTIERES

ESTIMATION DE LA TAILLE DE L'ÉCHANTILLON

Sample Size(*n*) for Various Confidence Levels

ConfidenceLevel(%)	Sample Size
95%	766
80%	328
90%	540
97%	938
99%	1318
99.9%	2142
99.99%	2982

Equation 1:

$$n_{min} = DE \times \frac{z^2_{1-\alpha/2} \times p \times (1-p)}{d^2}$$

Equation

Sample size $n = [DEFF*Np(1-p)]/ [(d^2/Z^2_{1-\alpha/2}*(N-1)+p*(1-p)]$

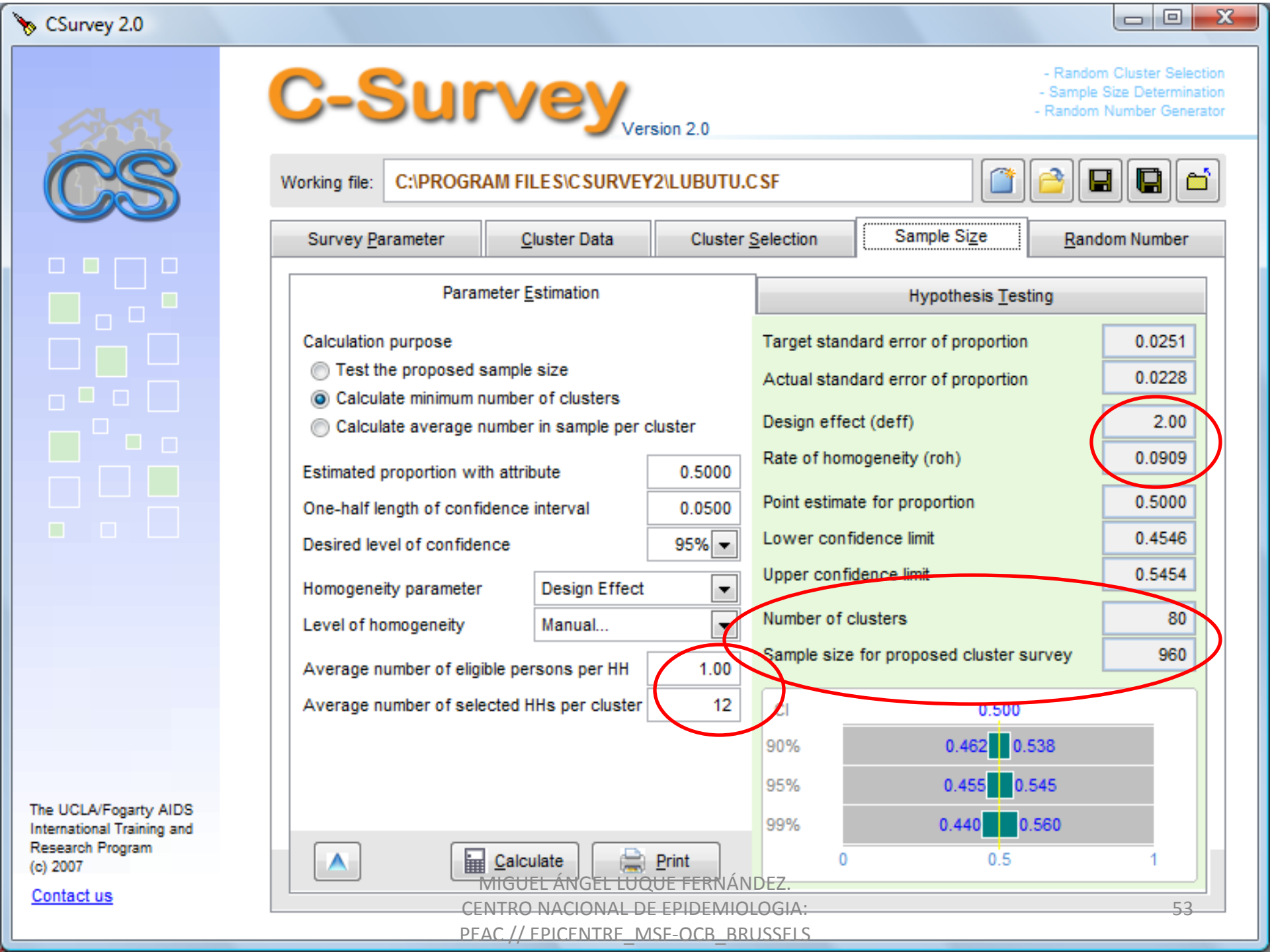
Results from OpenEpi, Version 2, open source calculator--SSPropor

file:///C:/Program%20Files/OpenEpi/SampleSize/SSPropor.htm
Source file last modified on 07/26/2007 15:54:54

Print from the browser, or select all or part of the text and then copy and paste to other programs.
Many browsers have an optional setting to print background colors.

Open Epi Save-Output-to-Disk Module

15:54


CSurvey 2.0
C-Survey
Version 2.0
- Random Cluster Selection
- Sample Size Determination
- Random Number Generator
Working file: C:\PROGRAM FILES\CSURVEY2\LUBUTU.CSF
Survey Parameter
Cluster Data
Cluster Selection
Sample Size
Random Number
Parameter Estimation
Hypothesis Testing
Calculation purpose
Test the proposed sample size
Calculate minimum number of clusters
Calculate average number in sample per cluster
Estimated proportion with attribute 0.5000
One-half length of confidence interval 0.0500
Desired level of confidence 95%
Homogeneity parameter Design Effect
Level of homogeneity Manual...
Average number of eligible persons per HH 1.00
Average number of selected HHs per cluster 12
Target standard error of proportion 0.0251
Actual standard error of proportion 0.0228
Design effect (deff) 2.00
Rate of homogeneity (roh) 0.0909
Point estimate for proportion 0.5000
Lower confidence limit 0.4546
Upper confidence limit 0.5454
Number of clusters 80
Sample size for proposed cluster survey 960
CI
0.500
90% 0.462 0.538
95% 0.455 0.545
99% 0.440 0.560
0
0.5
1
Calculate
Print
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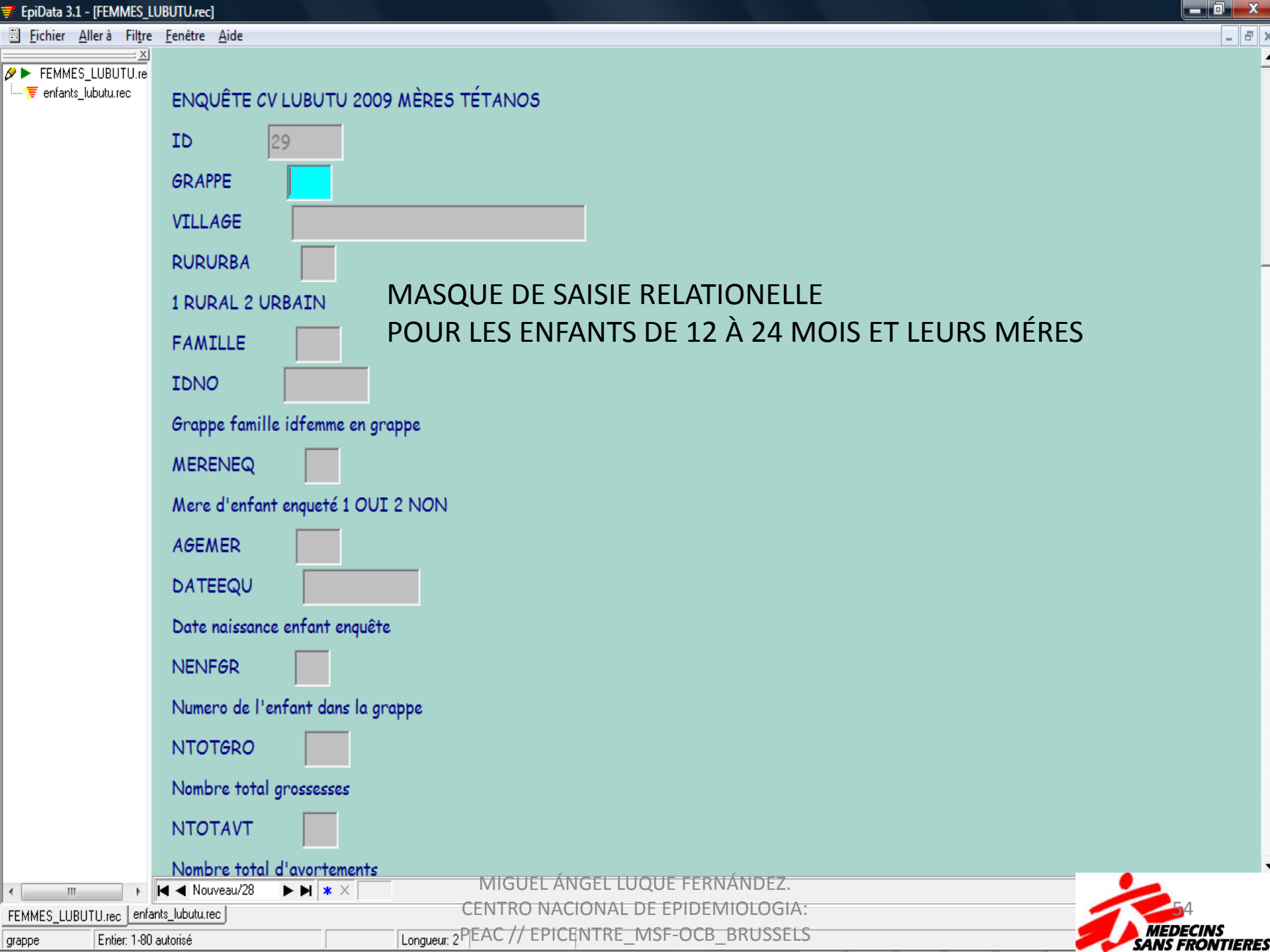

MASQUE DE SAISIE RELATIONELLE
POUR LES ENFANTS DE 12 À 24 MOIS ET LEURS MÉRES

Data Graphics Statistics User Window Help

Results

```
   WALIKALE     .7236842   .0433469     1.42304
      MAIKO          .75   .0677671     1.26897

NON
  KISANGANI     .3285714    .060998     1.17628
   WALIKALE     .2763158   .0433469     1.42304
      MAIKO          .25   .0677671     1.26897

. svy, vce(linearized): tabulate VACROUG MALROUG, column row obs pearson
(running tabulate on estimation sample)

Number of strata   =         1          Number of obs      =       960
Number of PSUs     =        80          Population size    =       960
                                        Design df          =        79

VACCINE   MALADE DE ROUGEOLE
ROUGEOLE      OUI    NON  Total

     OUI    .5323  .4677      1
            .6815  .6401  .6615
              338    297    635

     NON    .4862  .5138      1
            .3185  .3599  .3385
              158    167    325

   Total    .5167  .4833      1
                1      1      1
              496    464    960

  Key:  row proportions
        column proportions
        number of observations

  Pearson:
    Uncorrected   chi2(1)         =    1.8318
    Design-based  F(1, 79)        =    1.0585     P = 0.3067

.
```

PPV	PCV	ev= (pcv-ppv)/(ppv*(pcv-1)) EV (1)
0.661	0.532	0.4170061

Command