



PSYCHOSOCIAL RISK, EMPLOYMENT CONDITIONS AND MENTAL DISTRESS: A CROSS-SECTIONAL STUDY IN PERUVIAN MINERS

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1. RESUMEN

Título: Riesgo psicosocial, condiciones de empleo y distrés mental: estudio transversal en mineros peruanos.

Introducción: Los problemas de salud mental constituyen una fuerte carga económica en muchas sociedades. Los factores psicosociales en el trabajo están asociados con trastornos mentales comunes. Pocos estudios se han focalizado en mineros en términos de asociar los factores psicosociales con distrés mental. El objetivo del estudio fue evaluar la asociación entre el desequilibrio esfuerzo-recompensa, las condiciones de empleo y la prevalencia de distrés mental en mineros peruanos.

Métodos: Se realizó un estudio transversal en una mina subterránea metalífera en el Perú entre octubre y noviembre de 2015. Se distribuyó un cuestionario a una muestra de una población de aproximadamente 600 mineros (participantes 440, tasa de respuesta 73%). Se evaluaron las condiciones sociodemográficas y de empleo. Se calculó la relación esfuerzo-recompensa y se definió como ERI un valor igual o superior al tercil superior (valor 99). El distrés mental se definió con score mayor o igual a 3 en el cuestionario general de salud (GHQ-12). Las variables se analizaron mediante la prueba del chi cuadrado y regresión logística. Se utilizó el software Epi Info para analizar datos.

Resultados: La prevalencia de distrés mental fue 27%. El análisis de regresión logística no mostró asociación entre el desequilibrio esfuerzo-recompensa y el distres mental. Sin embargo, la adaptación inadecuada del trabajo a los asuntos sociales y familiares se asoció al distrés mental (OR 6.79, 1.60-28.90).

Conclusiones: Los trabajadores con adaptación inadecuada del trabajo a asuntos sociales y familiares pueden estar en mayor riesgo de distrés mental. La salud mental



debe abordarse mediante el soporte estratégico de la organización e involucramiento de la familia.



TITLE PAGE

PSYCHOSOCIAL RISK, EMPLOYMENT CONDITIONS AND MENTAL DISTRESS: A CROSS-SECTIONAL STUDY IN PERUVIAN MINERS

Original article

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The authors declare that there is not conflict of interests regarding to this study.

Key words: psychological stress, mental health, depressive symptoms, mining, working conditions, work-family conflict.

Place and Date: Lima Peru, February 28th 2017



COVER LETTER

Submission date: February 28th 2017

Roberto Lucchini M.D.
Associate Editor
Annals of Global Health

Dear Dr. Lucchini:

We are pleased to submit my manuscript entitled: "Psychosocial risk, employment conditions and mental distress: a cross-sectional study in Peruvian miners", for consideration as original article. This study is a cross-sectional study evaluating the association between effort-reward imbalance, employment conditions and the prevalence of mental distress in Peruvian miners. We found miners with inadequate adjustment of work to social and family matters may be at increased risk of mental distress.

This manuscript has not been previously published and is not under consideration in the same or substantially similar form in any other peer-reviewed media. We presented an earlier version of the manuscript as a plenary at the Summer School Teaching Interventions Crossing Borders organized by Ludwig Maximilians Universität in Munich, Germany in 2016.

All authors listed have contributed sufficiently to the study to be included as authors, and all those who are qualified to be authors are listed in the author byline. To the best of our knowledge, no conflict of interest, financial or other, exists. We have included acknowledgements, conflicts of interest, and funding sources after the discussion

Sincerely,

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2. ABSTRACT

Title: Psychosocial risk, employment conditions and mental distress: a cross-sectional study in Peruvian miners.

Introduction: Mental health problems constitute a heavy economic burden in many societies. Psychosocial factors at work are associated with common mental disorders. Few studies have focused on miners in terms of associating psychosocial factors with mental distress. This study aimed to evaluate the association between effort-reward imbalance, employment conditions and the prevalence of mental distress in Peruvian miners.

Methods: A cross-sectional study was carried out in a metalliferous underground mine in Peru between October and November 2015. A questionnaire was distributed to a sample from a population of about 600 miners (participants 440; response rate 73%). Socio-demographics and employment conditions were assessed. Effort-reward ratio was calculated and a value equal or above the upper tertile (value 99) was defined as ERI. Mental distress was defined as a score 3 or higher in general health questionnaire (GHQ-12). Variables were analyzed by using chi-square test and logistic regression. Epi Info software was used to analyze data.

Results: Prevalence of mental distress was 27%. Logistic regression analysis showed no association between effort-reward imbalance and mental distress. However, inadequate adjustment of work to social and family matters was associated to mental distress (OR 6.79, 1.60-28.90).

Conclusions: Workers with inadequate adjustment of work to social and family matters may be at increased risk of mental distress. Mental health needs to be approached based on strategic organizational support and family involvement.



Key words: psychological stress, mental health, depressive symptoms, mining, working conditions, work-family conflict.



3. INTRODUCTION

Global mental health:

Mental health disorders such as depression and substance abuse, accounts for a large part of the burden of disease. This high burden has a great negative impact on medical services costs, productivity (in terms of medical leave and unemployment) (1,2), life quality (3) and, also represents high costs for employers (7). World Health Organization has launched an action plan to address mental health and mitigate impact and effect (4).

Mental health at workplace:

An underestimation of mental health disorders reports from workers makes preventive programs difficult to implement because identification of cases is not well determined; workers´ fears of negative consequences at work are some of the causes of low number of reports (5). Number of mental distress claims are also underestimated compared to the number of reported cases of depression associated with work distress (6).

Psychosocial risk and mental health:

Researchers have studied mental health disorders and its association with psychosocial factors at work such as effort-reward imbalance (ERI) demonstrating an association between risk of depression, high psychosocial risk and ERI (8), however, social support turned out to be a protective factor (10). This association has been demonstrated in occupations such as nurses and teachers regarding to ERI associated with mental health disorders (11,12). Negative working conditions have also been demonstrated to predict depressive symptoms in US workers (9).

Contractors may be at higher risk at work since they are exposed to certain conditions such as type of contract, number of work hours, accident risk which impact negatively on mental health (13, 14).



Psychosocial risk and mental health in mining:

Research in mining has demonstrated that psychosocial factors have been associated with many health conditions. Mining activity involves the execution of tasks requiring high physical demands and exposure to specific environment and employment conditions such as noise, vibration, low illumination, chemical agents, ergonomic factors, shift work and accidents risk (15). Some studies in coal mines have found association between psychosocial factors such as ERI, depressive symptoms (16) and musculoskeletal conditions in terms of cases of back pain (18 – 20). Employment and working conditions in terms of psychosocial risk and violence have been associated to distress in Andean underground miners (21).

The present study is aimed to evaluate the association of effort-reward imbalance and employment conditions with the prevalence of mental distress in Peruvian miners.



4. METHODS

Study design:

The present study was an observational cross-sectional study. This study was carried out between October and November 2015 on workers from an underground metalliferous mining company in Peru, including participants working for the mine company and participants working for one contractor.

A health staff was trained in September 2015. This health staff consisted of doctors and nurses who received training on the interpretation and use of the instruments for adequate data collection, information confidentiality and anonymity.

Target population:

The target population in the present study corresponded to the mine workers of an underground metalliferous mining company of Peru.

The inclusion criteria for this population were as follows:

- Being a mine operator worker.
- The mine worker maintains a contractual relationship with the company or contractor.

Administrative workers or supervisors were excluded from this study.

About 600 mine workers were invited to participate in the study. Of those, 400 worked for the company and 200 worked for one contractor. Participation was voluntary. Each worker signed an informed consent.

After having evaluated the methodological considerations and having fulfilled the requirements, the Department of Basic Clinical Research Development and the Ethics Committee in Research of the Regional Hospital of Lambayeque (Peru), issued a certificate of approval for the execution of the study.



Data collection instruments:

Data collection was performed through questionnaires filled by mining workers who were surveyed between October and November 2015 at the medical center of the mining unit. Previously, workers were informed about the survey and were invited to participate voluntarily. In addition, workers were instructed to withdraw in any phase of the study. Workers from a contractor and from the company were invited to participate.

Working and health conditions were evaluated by using question modules obtained from the following instruments:

- VI National Survey of Working Conditions in Spain.
- First National Survey of Conditions of Employment, Labor, Health and Quality of Life ENETS 2009-2010 in Chile.
- National Household Survey on Conditions of Living and Poverty in Peru 2011.
- Minimum basic set of items for the design of questionnaires on working conditions and health.

To evaluate psychosocial factors, the following instrument was considered in the study:

- Effort-reward imbalance. Instrument: Questionnaire to evaluate the effort-reward imbalance to measure stress at work.

To evaluate the psychological well-being and prevalence of mental distress in the study population, the 12-item General Health Questionnaire (GHQ-12) validated for the Spanish population was used.

All instruments were self-filled by workers at the company's medical center. Instructions for filling were given by nurses and physicians trained in the procedure.



Variables:

For the present study the independent, dependent and confusing variables were defined and were operationalized according to the following scheme:

N	Type	Variable	Operational definition
1	Independent variable	Effort-reward imbalance	≥ upper tertile: Effort-reward imbalance
2	Independent variable	Age	< 20, 20-29, 30-39, 40-49, 50 or older
3	Independent variable	Education level	Primary, incomplete high school, complete high school, superior.
4	Confusing variable	Worker type	Contractor/Company
5	Confusing variable	Additional remunerated job	Yes/No
6	Confusing variable	Security on job continuity	Low/Medium/High
7	Confusing variable	Adjustment of work to social and family matters	Very good/Good/Not very good/Nothing good
8	Dependent variable	Mental distress	GHQ ≥3: Mental distress

One of the variables considered in the present study was adjustment of work to social and family matters which means how workers adapt their work schedule to meet family and social issues, thus reducing work-family conflict.

Data quality control:

Prior to data collection, a pilot study was conducted on 10 workers to evaluate the understanding of the questions and the time of the survey. The results of the pilot study determined a good understanding to the instruments' questions as well as a reasonable time to fill up the questionnaires. Therefore, it was not necessary to change the original questionnaire's structure.

Data information was collected anonymously and confidentially. Questionnaires were not associated with the name of the worker, they only contained an identification number which was given to the participant worker along with the telephone number and email of



the person in charge of the study so that he could state to withdraw his participation from the study by only indicating the identification number. Informed consents were filed separately from the surveys.

Statistical method:

Data were entered and analyzed by using the Epi Info version 7 tool of the US Centers for Disease Control and Prevention. A double entry of data was performed by two different and independent typists, both databases were submitted to an error check.

The chi² test was used for evaluation in terms of association between independent and dependent variables. Multiple logistic regression was used to determine the odds ratio of the dependent variable regarding to others exposure variables.



5. RESULTS

Descriptive results: (see table 1)

All of participants were male workers and 42% were workers from a contractor.

About 400 workers from the company were invited however 255 filled up the questionnaires (company response rate: 64%). About 200 workers from contractor were invited, however 185 responded (contractor response rate: 92%). Total response rate: 73%.

Overall prevalence of mental distress among miners was 27%. About 25% of participants were above the upper tertile of the effort-reward imbalance (ERI).

Table 1: Descriptive results:

Variable	Category	Frequency	Percent
Age (years)	<30	74	17.01%
	30-39	149	34.25%
	40-49	116	26.67%
	≥50	96	22.07%
Worker type	Contractor	185	42.05%
	Company	255	57.95%
Education level	Primary Education	37	8.51%
	Incomplete high school education	39	8.97%
	Complete high school education	196	45.06%
	Superior education	163	37.47%
Additional remunerated job	No	165	38.82%
	Yes	260	61.18%

Bivariate statistics:

According to the bivariate analysis, ERI was mainly present among younger miners, workers from contractor and among those having an additional remunerated job (see table 2). ERI was less present among workers with high security on job continuity and with good adjustment of work to social and family matters.

Table 2: Bivariate analysis of effort-reward imbalance

Variable	Missing values	Category	Effort-reward imbalance (ERI)				Pchi ²
			<upper tertile		≥upper tertile		
			n	%	n	%	
Age (years)	5	<30	27	10.00	27	30.34	<0.01
		30-39	80	29.63	32	35.96	
		40-49	82	30.37	24	26.97	
		≥50	81	30.00	6	6.74	
Education level	5	Primary Education	28	10.37	4	4.49	0.10
		Incomplete high school education	28	10.37	5	5.62	
		Complete high school education	110	40.74	43	48.31	
		Superior education	104	38.52	37	41.57	
Worker type	5	Contractor	67	24.81	51	57.30	<0.01
		Company	203	75.19	38	42.70	
Additional remunerated job	15	No	130	48.51	19	21.35	<0.01
		Yes	138	51.49	70	78.65	
Security on job continuity	9	Low	21	7.78	24	26.67	<0.01
		Medium	70	25.93	36	40.00	
		High	179	66.30	30	33.33	
Adjustment of work to social and family matters	20	Very good	110	42.47	16	18.18	<0.01
		Good	101	39.00	33	37.50	
		Not very good	40	15.44	28	31.82	
		Nothing good	8	3.09	11	12.50	

Likewise, miners with higher education level, workers from contractor, workers having an additional remunerated job, with low-medium security on job continuity and

inadequate adjustment of work to social and family matters were more likely to be affected by mental distress (see table 3).

Table 3: Mental distress in miners, bivariate analysis between employment conditions, psychosocial risk and results of General Health Questionnaire (N= 600)

Variable	Category	GHQ-12 ≥ 3		Pchi ²
		n	%	
Age (years)	<30	22	24.72	0.09
	30-39	29	32.58	
	40-49	25	28.09	
	≥50	13	14.61	
Education level	Primary education	5	5.62	<0.01
	Incomplete high school education	5	5.62	
	Complete high school education	54	60.67	
	Superior education	25	28.09	
Worker type	Contractor	43	59.72	<0.01
	Company	29	40.28	
Additional remunerated job	No	19	22.35	<0.01
	Yes	66	77.65	
Security on job continuity	Low	23	26.14	<0.01
	Medium	42	47.73	
	High	23	26.14	
Adjustment of work to social and family matters	Very good	15	16.85	<0.01
	Good	32	35.96	
	Not very good	30	33.71	
	Nothing good	12	13.48	

GHQ: General Health Questionnaire

Logistic regression statistics:

ERI was associated to mental distress in the crude analysis. However, when results were adjusted, this association was not found. It was shown that workers with inadequate

adjustment of work to social and family matters was associated to distress (OR:6.79; CI 95%: 1.60 - 28.90) (see table 4).

Table 4: Adjusted odds ratio with 95% confidence interval for psychosocial risk, employment conditions and mental distress

Term	Category	OR crude	95% C.I.		OR adjusted	95% C.I.	
			Lower limit	Upper limit		Lower limit	Upper limit
Effort-reward imbalance	<upper tertile	1					
	≥upper tertile	3.12	1.78	5.5	1.42	0.66	3.06
Age (years)	<30	1					
	30-39	0.4	0.1839	0.86	0.50	0.19	1.27
	40-49	0.38	0.1768	0.83	1.18	0.39	3.54
	≥50	0.22	0.09	0.52	1.48	0.35	6.30
Worker type	Contractor	1					
	Company	0.16	0.09	0.28	0.55	0.20	1.55
Education level	Primary Education	1					
	Incomplete high school education	0.96	0.22	4.27	1.16	0.21	6.53
	Complete high school education	3.02	0.97	9.23	1.49	0.33	6.85
	Superior education	1.2	0.38	3.82	0.68	0.14	3.36
Additional remunerated job	No	1.00					
	Yes	3.14	1.80	5.49	1.72	0.69	4.26
Security on job continuity	Low	1					
	Medium	0.66	0.34	1.29	1.14	0.42	3.08
	High	0.12	0.058	0.24	0.31	0.09	1.04
Adjustment of work to social and family matters	Very good	1					
	Good	2.39	1.19	4.83	1.96	0.79	4.89
	Not very good	5.68	2.71	11.92	3.34	1.23	9.04
	Nothing good	10.77	3.61	32.11	6.79	1.60	28.90

OR: Odds ratio



6. DISCUSSION

This cross-sectional study showed a prevalence of mental distress of 27% among miners of an underground metal mine in Peru, associated to an inadequate adjustment of work to social and family matters as its main predictor; 25% of participants showed a higher probability of effort-reward imbalance.

In the present study, the prevalence of mental distress resulted in similar value to another cross-sectional study (29%) that included also formal miners in Peru (20) where higher social support was related to less distress. In this study, 30.5% of Peruvian miners reported high job security in contrast to 54.52% reported in the present study. Both studies were performed through interviews during work hours; however, the GHQ 12 cutoff value used in the present study was ≥ 3 (this cutoff was selected to increase sensitivity) in contrast to the cutoff value of ≥ 4 used in the study of reference.

There has been some inconsistency between ERI and the outcome in studies on miners. In the present study ERI had no effect on the prevalence of mental distress when the variables were adjusted, these results could be explained by the higher income of miners which would reduce the ERI (21). Another study also showed no association between ERI and the outcome which was cigarette smoking. In contrast, another study showed association between ERI and depressive symptoms among Chinese coal miners (16). One study showed job insecurity as factor to explain depressive symptoms in different occupational groups (17). In the present study, high security on job and being a company worker tended to be protective factors against mental distress, however, when adjusted, this association disappeared.

An association between inadequate adjustment of work schedule to family and social matters, with mental distress was found in the present study (OR 6.79 95% CI 1.60 – 28.9 for nothing good adjustment) which may reflect a work-family conflict. The



association between work-family conflict and depression has been found in studies including non- miner participants (23-25, 27,28).

Miners in this study were subject to rosters, they were away about 2 weeks from their families and exposed to high work demands. This is consistent with another study on miners (16) which showed work-family conflict to be positively related to depressive symptoms.

This study had some limitations. The association found in a cross-sectional study may be difficult to interpret and should be analyzed carefully. The number of participants in this study was low; even though about 600 workers were invited, only 440 participated resulting in a response rate of 73%. The association between mental distress and adjustment of work to social and family matters showed a wide confidence interval which could decrease the power of this study. The healthy worker effect may have resulted in selection bias since workers in sickness leave affected by some kind of mental distress related disease were not tracked.

In conclusion, the present study showed that the inadequate worker's adjustment of work to family and social matters can negatively impact on mental health, therefore, there is need to establish a strategic support from the company to improve working conditions and enhance the importance of a comprehensive assessment of psychosocial factors. Intervention strategies through organizational support and managers support are required to approach the work-family conflict and include worker's family in order to improve the workers' adjustment and decrease the risk of mental distress (16, 24, 26).



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The authors declare that there is not conflict of interests regarding to this study.

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9. IMPORTANCE OF THIS THESIS FOR OCCUPATIONAL SAFETY AND HEALTH IN LATIN AMERICA

Mining is one of the most important labor activities in several Latin American countries such as Peru, Chile and Bolivia. It has a great impact on the economies of the countries and generates investment and employment. Governments and private companies focus on mining as it contributes to the country's economic and social development. However, mining has also been linked to precarious working conditions that have resulted in fatal and non-fatal accidents and occupational diseases.

Legislation in Peru has made advances in relation to safety and health, not only in mining but also in all labor sectors. The evaluation and control of the physical, chemical, ergonomic and psychosocial risks are important subjects of the legislation.

Mining workers are a sensitive group as they are exposed to working conditions that affect their physical and mental condition. Few studies have investigated regarding the impact of psychosocial factors and employment conditions on mental health of miners in countries of Latin America, including Peru. The present study has contributed to the analysis of these factors as a negative impact on the mental health of miners in a Peruvian private company.

10. ANNEXES

10.1 Guide for authors:

Revista	Annals of Global Health
Aspectos generales	
Tipo de artículo	Original.
No de palabras	< =5000
No de tablas/gráficas	No hay límite (dentro de lo razonable)
Idioma	Inglés
Interlineado	Doble espacio
Letra	No especificado
Numeración	Parte superior de la página
Guía	Elsevier
Material online	Si
Primera página	
Título	<= 12 palabras
Autores	Nombre, apellido(s), grados académicos, afiliación
Afiliación	Institución de los autores
Autor de correspondencia	Dirección postal, email
No Autores	No indicado
Recuento de palabras	Texto principal, resumen
Segunda página	
	Declaraciones de autoría, financiación, agradecimientos y conflictos de intereses
3a página: Resumen (español)	
Forma	Estructurado
Palabras	<=300
Palabras claves	5-8 términos "MESH"
4a página: Abstract (inglés)	
Forma	Estructurado (background, objective, method, findings and conclusions)
Palabras	<=300
Palabras claves	5-8 términos "MESH"
5a-12a página: Texto principal	
Introducción	1-2 paginas concluyendo con el objetivo del estudio
Métodos	1-3 páginas
Resultados	1-3 páginas

Discusión	1-3 páginas
Bibliografía	
No referencias	<=40
Identificación	Superíndice, numeración consecutiva según orden en el texto
Estilo internacional	American Medical Association
Ejemplo (revista)	A.F. Corno (Ed.), Congenital Heart Defects: Decision Making for Cardiac Surgery, Vol. 2, Springer, Heidelberg, Germany (2004)
No Autores a mencionar	<=6, Si >3: cita los primeros 3 seguidos de "et al."
Tablas	
Numeración	Números arábigos, referencia en el texto a cada tabla
Título	Breve, parte superior
Letra	>=10
Interlineado	1 o 1,5
No paginas	<=1
Lugar	No especificado
Estilo	Sin líneas interiores, ni formatos automáticos (sombreados etc.)
Columnas	Con breve encabezado
Notas explicativas	A pie, llamadas con letras minúsculas en superíndice en orden alfabético
Figuras	
Numeración	Números arábigos, referencia en el texto a cada figura
Título	Breve, al pie de la figura
Formato	300 dpi o mayor es requerido. No usar Word, PDF, Power point para fotografías o ilustraciones.
Notas explicativas	A pie, llamadas con letras minúsculas en superíndice en orden alfabético. Texto entre 12 y 14 puntos.
Contenido	No deben repetir datos presentados en el texto/las tablas
Cuadro final	
¿Qué se sabe sobre el tema?	No especificado
¿Qué añade el estudio realizado a la literatura?	No especificado



10.2 Individual contributions

It is stated that the author and co-authors involved in this project have fulfilled the URM-ICMJE criteria, which are as follows:

1. Substantial contributions in the design of the project, analysis and interpretation of data.
2. Elaboration of the work and revision of the important intellectual content.
3. Accountability agreement on all aspects of the work, ensuring that questions related to the accuracy and completeness of any part of the project were appropriately investigated.

Ismael Cruz, Astrid Garrido and Katja Radon have developed this project.

The data were collected by Ismael Cruz, the analysis, interpretation of the results and the critical review were made by the three authors, as well as the final version to be published in the future.

Declaration of Independence:

I, Ismael Cruz, Peruvian identified with the National Identity Document 09675269, declare that the present study "Psychosocial risk, employment conditions and mental distress: a cross-sectional study in Peruvian miners", has been carried out independently, has not used other sources and/or references as indicated in this manuscript and has not been previously published and is not under consideration in the same or substantially similar form in any other peer-reviewed media.

Ismael Cruz M.D.


10.3 Authors contribution


Effort	Individual contribution (%)	Others contribution (who, what, how much)
Concept	85	Lic. Astrid Garrido, project design and review, 10% Prof. Katja Radon, project design and review, 5%
Field work	100	
Data analysis	80%	Lic. Astrid Garrido, review and results interpretation, 15% Prof. Katja Radon, review and results interpretation, 5%
Manuscript	60%	Lic. Astrid Garrido, critical review and intellectual contribution, 25% Prof. Katja Radon, critical review and intellectual contribution, 15 %


10.4 Curriculum vitae

[Curriculum vitae](#)

PERSONAL INFORMATION **Ismael Cruz**

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WORK EXPERIENCE

1 Oct 2013–Present **Corporate physician**
Minsur S.A., Lima (Peru)
Physician in charge of planning, implementation and monitoring of health programs in 3 mining units and 3 mining projects in Peru as well as in 2 mining units in Brazil. Support to Corporate Safety Management.

1 Mar 2008–30 Sep 2013 **Medical coordinator**
Votorantim Metais, Lima (Peru)
Coordination in Occupational Hygiene and Labor Medicine activities as well as in Preventive and Promotional Medicine. Participation in Safety, Health and Environmental Committee. Support to Corporate Safety Management. Internal Auditor of Safety and Health System.

EDUCATION AND TRAINING

1 Apr 1992–30 Mar 2000 **Title of Physician Surgeon**
Cayetano Heredia University, Lima (Peru)
Medical School

1 Apr 2010–30 Mar 2012 **Master in Occupational Health**
San Marcos University, Lima (Peru)
Master Science

PERSONAL SKILLS

Mother tongue(s) Spanish

Other language(s)

	UNDERSTANDING		SPEAKING		WRITING
	Listening	Reading	Spoken interaction	Spoken production	
English	B2	C1	B1	B2	B2

Levels: A1 and A2: Basic user - B1 and B2: Independent user - C1 and C2: Proficient user
[Common European Framework of Reference for Languages](#)

Communication skills Good communication skills through providing working training.

Organisational / managerial skills Leadership: currently responsible for 6 safety chiefs who are responsible for a safety team in each mining unit.



LUDWIG-
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MÜNCHEN

CH CENTER FOR
INTERNATIONAL
HEALTH
Occupational and Environmental Epidemiology & NetTeaching Unit
Institute for Occupational, Social and Environmental Medicine



Curriculum vitae

Ismael Cruz

Job-related skills Coordinator of different activities in safety management.
Good approach of stressful situations.

Digital competence

SELF-ASSESSMENT				
Information processing	Communication	Content creation	Safety	Problem solving
Independent user	Proficient user	Basic user	Independent user	Independent user

Digital competences - Self-assessment.pdf