









School of Food and Nutritional Sciences

A Guide on Iron During Pregnancy

Mairead Kennedy, MSc & Elaine McCarthy, PhD

Disclaimer:

The information in this guide is not meant to replace advice from your healthcare team. It is intended for education and information purposes only. If you have any other conditions during pregnancy, for example; diabetes or have had previous bariatric surgery, please check with your healthcare team before using this guide as some foods or recipes may not be suitable for you.

Copyright ©:

Project Supervising Editor: Dr Elaine McCarthy. Nutritional Analysis and Recipe Development: Mairead Kennedy, Dr Elaine McCarthy. Photography and Food Styling: Jette Virdi www.jettevirdi.com Additional Photography: Shutterstock. Graphic Design: Jonathan Leahy Maharaj, UCC Academy.

First published in 2024 by the School of Food and Nutritional Sciences, University College Cork. © School of Food and Nutritional Sciences, University College Cork.

All rights are reserved. No part of this book may be reprinted or reproduced or utilised in any electronic, mechanical or other means, now known or hereafter invented, including photocopying, without the prior written permission of Dr Elaine McCarthy (elaine.mccarthy@ucc.ie), School of Food and Nutritional Sciences, University College Cork.

The production of this guide was supported by the Health Research Board of Ireland (through grant number ARPP-2020-008) and the Ireland South Women and Infants Directorate.









School of Food and Nutritional Sciences



This guide is designed to provide pregnant women and their families with information about the importance of iron during pregnancy.

Iron deficiency is common during pregnancy, therefore it's important to understand how intakes of iron in the diet can be increased to help reduce the risk of iron deficiency.

This information guide is not to replace advice or guidance from your healthcare team. It is designed to help educate and support, providing tips and simple, practical recipes to help increase iron intakes in the diet.

The contents of this guide have been endorsed by the Irish Nutrition & Dietetic Institute (INDI) INDI Irish Nutrition + Dietetic Institute



Why is iron so important during pregnancy?

Iron is needed for every cell and organ in the body to work, but it is especially needed to produce red blood cells. Red blood cells contain a protein called haemoglobin. Haemoglobin carries oxygen around your body and to your baby to support their growth and development.

Pregnancy increases your need for iron for three reasons. Firstly, the amount of blood in the body increases to support mother and baby. Secondly, the baby needs iron to support its growth and development, particularly of the brain. Thirdly, your baby needs to collect enough iron to lay down iron stores to use from birth until they begin weaning onto solid foods.

What happens if I don't have enough iron?

If you don't have enough iron in your body, this can lead to iron deficiency. If this is untreated and persists, this can progress into iron deficiency anaemia. Iron deficiency anaemia is a condition where a lack of iron in the body leads to a lower number of red blood cells.

It is important to identify and treat iron deficiency and iron deficiency anaemia either before or during your pregnancy to avoid increased risks to you and your baby.

Consequences of low iron *for you* may include:

- Increased risk of infection.
- Increased likelihood of needing a blood transfusion after the birth of your child.
- Increased risk of postnatal depression and fatigue.

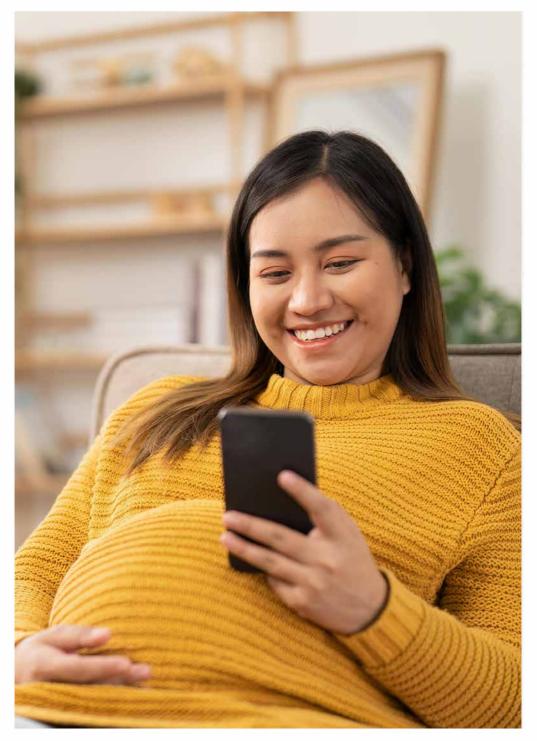
Consequences of low iron *for your baby* may include:

- Increased risk of premature birth or being born a low birth weight.
- Increased likelihood of being born with iron deficiency.
- Increased risk of adverse effects on brain development, leading to poorer intelligence, cognition, and behaviour.

Am l at risk of low iron?

During pregnancy, your body needs more iron than before pregnancy putting you at increased risk of iron deficiency. Your risk may be even higher if you:

- Have had pregnancies less than one year apart.
- Are pregnant with more than one baby.
- Have not eaten or have difficulty eating iron-rich foods, due to nausea or vomiting or some other reason.
- Had low iron stores or a diagnosis of iron deficiency or anaemia before you became pregnant.
- Had bariatric surgery.
- Have gastrointestinal issues such as Inflammatory Bowel Disease, coeliac disease and so on.





What symptoms should I watch out for?

The main symptoms of iron deficiency and iron deficiency anaemia include:

- Fatigue and tiredness.
- Weakness.
- Shortness of breath.
- Dizziness or feeling lightheaded.
- Palpitations.
- Headaches.
- Restless legs, cold hands or feet.
- Poor concentration, limited capacity for work or exercise.

How will I know if I have low iron?

At your first antenatal (booking) appointment in the hospital, your healthcare team will do blood tests on you to assess your iron status.

If you are diagnosed with iron deficiency or iron deficiency anaemia, your healthcare team will advise you on next steps.

What can I do to increase my intake of iron?

If you are diagnosed with iron deficiency or iron deficiency anaemia, your healthcare team will likely prescribe you an iron supplement. However, with or without a diagnosis of iron deficiency or iron deficiency anaemia, it is important to increase the amount of iron in your diet during pregnancy.

Iron in food comes in two types, haem iron and non-haem iron. Haem iron is mainly found in animal food sources and is easier for your body to absorb. Non-haem iron is readily found in other foods, particularly plant-based sources.

The main dietary sources of haem iron are:

- Lean red meat such as beef, lamb, pork.
- Poultry such as chicken.
- Fish, such as sardines, salmon.

Sources of non-haem iron include:

- Fortified breakfast cereals.
- Beans, peas, lentils.
- Eggs.
- Bread (wholemeal).
- Green leafy vegetables (broccoli, spinach).
- Dried fruit (apricots, dates, figs), nuts and seeds.
- Tofu.

Non-haem iron is not easily absorbed by the body, so to boost your absorption of this iron, eat these iron-rich foods alongside foods rich in vitamin C, like:

- Fruit (kiwi, oranges, grapefruit, strawberries, raspberries, fruit juice).
- Potatoes.
- Vegetables (peppers, broccoli, cabbage, leeks, peas, broad beans).

NOTE

Avoid liver and liver products when you are pregnant. This is because they have a high Vitamin A content, which can be harmful to your baby.

NOTE

If you have diabetes in pregnancy, you will need to avoid fruit juice, so please choose food-based sources of vitamin C from list instead.

Avoid consuming tea, coffee or milk for at least one hour before or after eating iron-rich foods, as these can reduce the absorption of iron.

Examples of Food Sources of Iron

Haem Iron Sources	Iron Content per Serving
Lean red meat, beef, pork, lamb (75g serving)	1.5 - 1.8 mg
Chicken breast (medium sized, 75g)	0.4-0.8 mg
Sardines, salmon (½ can)	0.6-1.0 mg
Non-Haem Iron Sources	Iron Content per Serving
Fortified breakfast cereals (e.g Weetabix, Corn Flakes, Cheerios, small-medium bowl, 30-45g)	2.4 - 6.0 mg (depends on brand)
Porridge oats (30g)	0.8-1.0 mg
Readybrek/smooth fortified oats (30g)	3.5 mg
Chickpeas, kidney beans (½ small can)	1.0 - 1.4 mg
Eggs (2 average size)	2.0 mg
Wholemeal bread (2 slices)	1.5 - 1.8 mg
Broccoli (4 spears)	1.0 mg
Spinach (cooked, 3 tablespoons)	1.7 mg
Dried apricots (3)	1.0 - 1.2 mg
Tofu (cooked, 100g)	3.5 mg

Women need **16mg of iron every day during pregnancy**, but this may be higher if your iron stores are low. Women are advised to eat iron-rich foods **twice per day** during pregnancy, including a mix of haem and non-haem iron sources where possible.

Try out some of the meal and snack suggestions found in this guide – these can help to increase the intakes of iron in your diet.

What do I need to do if I have been prescribed an iron supplement?

If you have been diagnosed with iron deficiency or iron deficiency anaemia and prescribed to take an iron supplement by your healthcare team, you should follow the recommendations below (unless otherwise specified by your healthcare team):

- Remember to please advise your healthcare team if you are taking any other medications before starting iron supplements.
- Take iron supplements in the morning, on an empty stomach if possible or at least one hour before meals.
- Take your iron supplement with a source of vitamin C such as a glass of pure orange juice as this will make it easier to absorb iron. If you have diabetes, please take your supplement with water.
- Avoid tea, coffee and highly fibrous foods for at least one hour before or after you take your iron supplement as otherwise you won't absorb the iron as well. The phytic acid found in high fibre foods and the polyphenols found in coffee and teas inhibit iron absorption.
- Don't take iron supplements with milk (including fortified milks), antacids, or calcium supplements.
- Some people experience gastrointestinal issues such as constipation, nausea or bloating when taking iron supplements, and may benefit from alternative supplementation protocols. If experiencing constipation, increasing your fibre and fluid intakes along with taking your supplement on alternative days can help.
- If you experience any ill effects of taking iron supplements or if you follow a vegetarian or vegan diet, please discuss this with your healthcare team.

Note: General or pregnancy-specific multivitamin supplements are not typically recommended for the treatment of iron deficiency or iron deficiency anaemia. Your healthcare team can advise as to what iron supplements are suitable for the treatment of iron deficiency and iron deficiency anaemia.



Guide for the Iron-Rich Recipes

This guide contains a series of iron-rich recipes for you to try. These recipes are mainly for lunch or dinner, but we've also included some snacks for you to try.

Recipes will be flagged with the following icons:



Rich source of iron

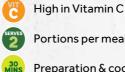


Suitable for batch cooking

Suitable for home freezing



Vegetarian option



Portions per meal

Preparation & cooking time

Vegan option

Our icons will guide you as to how long each recipe takes to prepare and cook and for how many adults it serves. Lots of our recipes are great for batch cooking and home freezing, to help prepare for busier times ahead. Each recipe has the potential allergens listed, alongside the nutritional information per serving of the recipe (excluding side dishes or serving suggestions).

The main sources of iron in each recipe are marked in **bold** and identified by the red arrow icon in the ingredient list. By highlighting these key iron sources, our hope is that you'll be able to modify these recipes going forward to include more iron-rich meals and snacks within your diet.

Mushroom & Tofu Stir Fry

This stir fry is high in iron and the perfect mid-week dinner, quick







Ingredients:

2 tablespoon peanut/olive oil 450g mushrooms 1 medium red pepper 5 spring onions 10g grated ginger

1 large garlic clove 3 tablespoon oyster sauce 🕢 250g tofu

🕢 300g spinach

640g brown rice cooked

Method:

- Add cooking oil to a large pan and place on high heat.
- Add in chopped mushrooms and peppers and cook until soft for approximately 4-5 minutes.
- Add in spring onions, ginger, and garlic. Cook for another minute. Then transfer vegetables to a bowl.
- Add tofu to the pan, cook turning once, until browned for 3-5 minutes. Stir back in the cooked vegetables, spinach and oyster sauce and cook for approx. 2 minutes, until spinach wilts.
- Stir in rice and serve.

Top Tip:

To make this suitable for vegetarians & vegans, replace the oyster sauce with 3 tablespoons of vegetarian oyster sauce or soy sauce.

Typical values per serving:

Energy	Carbohydrate	Protein	Fat	Iron
400kcal	56g	17g	11g	6.1mg

Allergens: peanut, molluscs, soya, sulphites.

25

State States

Lentil Bolognese

This iron-rich Lentil Bolognese is packed full of flavour, sure to be a favourite of all the family.





Ingredients:

3 teaspoon olive oil

2 medium onions chopped

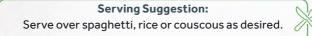
- 1 medium carrot
- 2 sticks celery chopped
- 3 garlic cloves

🕢 1 x 400g tin red lentils, drained

- 1 x 400g tin kidney beans, drained
- 1 x 400g tin chopped tomatoes 2 teaspoon tomato puree 2 teaspoon dried oregano 2 teaspoon dried thyme 500ml vegetable stock
- 🕢 200g spinach

Method:

- Roughly chop all vegetables. Add oil, carrots, onions, garlic and celery to a large saucepan and place on a medium heat. Cook gently for 15-20 minutes until vegetables are softened.
- Stir in the lentils, chopped tomatoes, kidney beans, tomato puree, herbs and stock.
- Bring contents of saucepan to a simmer and place on a low heat for 40-50 minutes until the lentils are soft.
- Add in spinach and stir until wilted.
- This dish can be cooled and chilled for up to 3 days or frozen for up to 3 months.



Typical values per serving:

Energy	Carbohydrate	Protein	Fat	Iron
405kcal	59g	26g	4.5g	9.3mg

Allergens: celery.

Lamb Tagine

This hearty dish hails from Morocco and is packed full of iron-rich ingredients, perfect for family dinners, entertaining friends or batch cooking.

Ingredients:

2 tablespoon hot paprika 1 tablespoon ground coriander

1 tablespoon turmeric

2 teaspoon ground cinnamon

2 teaspoon ground cumin

2 teaspoon coarse ground black pepper

600g lean lamb cut into 4cm (1¹/2in) chunks

4 garlic cloves, chopped

3 onions, roughly chopped

1 thumb of fresh root ginger, peeled and chopped

2 tablespoon olive oil

400g tin chopped tomatoes

400ml chicken stock

2 tablespoon clear honey

225g (8oz) Medjool dates, cut in half and stones removed

🕢 100g spinach

NOTE

This dish can be cooled and chilled for up to 3 days or frozen for up to 3 months.

Method:

- Mix together the paprika, coriander, turmeric, cinnamon, cumin and pepper in a large bowl, then tip half into a small bowl and set aside. Add the lamb to the large bowl and coat in the spices. Cover with clingfilm and chill overnight (or for 2-3 hours) to marinate.
- Preheat the oven to 160°C
 (325°F/Gas Mark 3).
- Place the garlic, onions and ginger into a food processor and pulse until finely minced (or chop very finely, if you don't have a food processor). Heat a large heavy-based casserole dish over a medium heat.
- Add 1 tablespoon of oil and brown off the marinated lamb. Add the remaining tablespoon of oil to the pan, then add the garlic/onion/ ginger mixture and cook for a few minutes, until softened but not coloured. Stir in the reserved spice mixture and cook for another minute or so, until well combined.
- Pour the chopped tomatoes, stock and honey into the pan containing the browned lamb, stirring to combine. Bring to the boil, cover and transfer to the oven.
- Cook for 1 hour, stirring in the dates and spinach halfway through, until the lamb is completely tender and the sauce has thickened and reduced. Season to taste.

Serve over a bed of couscous with Greek yoghurt to garnish.

Typical values per serving:

Energy	Carbohydrate	Protein	Fat	Iron
414kcal	41g	25g	15g	4.4mg

Chicken Broccoli Bake

This family-friendly chicken dish can be served with any of your staples in the cupboard – potatoes, pasta, rice or bread.





Ingredients:

- 1 medium onion
- 1 tablespoon olive oil
- **500g chicken breast**
- 🕢 500g broccoli
- 🕢 200g spinach
- 200g peas

For the sauce:

- 25g margarine (or butter) 50g plain flour 500ml low fat milk
- 1 chicken stock cube
- 1 teaspoon curry powder

For the topping:

50g light grated cheese 50g breadcrumbs

Method:

- Pre heat oven to 180°C (350°F/Gas Mark 4).
- Wash and dry broccoli and cut into florets and peel and dice onion. Cut chicken breasts into cubes.
- Heat oil in large pan, brown chicken and add onion and cook for 3-5 minutes.

For the sauce:

- Add flour, margarine, milk and stock cube into a saucepan and whisk until it boils and thickens.
- Add in curry powder and season, as desired.

Assembly:

- Layer chicken, broccoli, peas and spinach in a casserole dish and pour sauce over the top.
- Mix breadcrumbs with cheese and scatter over the sauce.
- Bake in the oven for 30-45 minutes until nicely browned.

Serving Suggestion: Serve with baked potato, rice or pasta.

Typical values per serving:

Energy	Carbohydrate	Protein	Fat	Iron
493kcal	35g	50g	15g	4.6mg

Allergens: wheat, milk.



Chilli Con Carne

A one-pot meal packed full of nutrients, great for anyone fond of batch cooking.



2 tablespoon olive oil

1 onion

1 chilli

1 medium red/yellow pepper

3 cloves garlic

500g lean beef mince

1 teaspoon cayenne pepper

1 teaspoon cinnamon

2 tablespoon cumin

1 tablespoon paprika

1 x 400g tin chopped

🕢 tomatoes

1 x 400g tin red kidney beans, drained

Juice of 1 lime

1 tablespoon honey

10g fresh coriander, chopped

Chilli flakes, dried (if desired)

Typical values per serving:

Energy	Carbohydrate	Protein	Fat	Iron
348kcal	21g	34g	12g	6.3mg

Method:

- Add olive oil to a large saucepan and place on a medium-high heat. Add in diced onion and sauté for 10 minutes.
- Add in chopped chilli, peppers and garlic and cook for a few minutes.
- Add in minced beef and spices and cook until meat has browned.
- Add in chopped tomatoes and simmer for 20 minutes.
- Stir in kidney beans, and lime juice and simmer for a further 5-10 minutes. Add in the fresh coriander and honey to taste. Add in some dried chilli flakes if you like it spicier.
- Season well with salt and pepper.

Serving Suggestion:

Serve with brown rice, shredded lettuce, guacamole and some grated cheddar cheese.





Iron-Rich Frittata



COLUMN STREET



A delicious recipe for a simple dinner or lunch, packed full of vegetables.

Ingredients:

4 eggs 20ml water

80g spinach

1/2 red pepper 1 cup cherry tomatoes

3 tablespoon tinned red kidney beans, drained

1 teaspoon olive oil 15g low fat cheddar cheese

Method:

- Whisk 4 eggs and water in bowl. Season with salt and pepper, as desired.
- Chop spinach, cherry tomatoes and peppers. Add vegetables and kidney beans to egg mix.
- Add olive oil to the saucepan and place on a low heat. Add mixture to frying pan and cook for 8-10 minutes.
- Add cheese to top of the frittata and transfer to the grill for 3-5 minutes.

Serving Suggestion: Accompany with a side salad & enjoy!

Typical values per serving:

Energy	Carbohydrate	Protein	Fat	Iron
259kcal	8.9g	20g	15g	3.4mg

Allergens: eggs, milk.

Chicken & Chorizo Pasta

This wholesome dish is sure to be a favourite of all the pasta lovers.

Ingredients:

1 tablespoon olive oil

50 SERVES VIT

- 1 teaspoon chilli flakes
- 2 cloves garlic, chopped
- 150g cherry tomatoes
- **450g chicken breast**
- 🕢 80g chorizo

200g peas

300g passata

150g light cream cheese

200g spinach

500g cooked spaghetti

Method:

- Chop garlic and cherry tomatoes and add to a saucepan with oil and chilli flakes on medium heat. Cook for 3 minutes.
- Cook pasta in salted water until al dente.
- To the garlic and tomatoes, add in diced chicken breast and cook for 5-10 minutes.
- Add in chopped chorizo and peas and stir. Following this, add in passata and light cream cheese.
- Stir sauce until boiling and turn down the heat. Add in spinach.
- Drain pasta and add to chicken and chorizo mix in saucepan with approx. 50-100ml of pasta water.
- Mix until sauce is evenly distributed.

Typical values per serving:

Energy	Carbohydrate	Protein	Fat	Iron
563kcal	50g	49g	15g	4.1mg

Allergens: wheat, milk.

Spinach Hummus Dip

MINS SERVES (VESAL)

A great accompaniment with any meal or served on its own as a healthy snack.

Ingredients:

1 x 400g tin chickpeas, drained

🕢 100g tahini paste

40ml lemon juice

45g onions (¼ medium onion)

3 tablespoon fresh parsley

1 red chilli

Salt (pinch)

🕢 200g spinach

Typical values per serving:

Energy	Carbohydrate	Protein	Fat	Iron
100kcal	4.4g	4.7g	6.5g	2.0mg

Allergens: sesame.

Method:

- Combine all ingredients except spinach in food processor/blender and process until smooth. If necessary, add tablespoons of water to thin consistency.
- Add the spinach and process until smooth and dark green.
- Chill in fridge for 30-60 minutes to blend flavours before serving.

Serving Suggestion: Enjoy with red pepper, carrot or celery sticks.



Chocolate Orange Weetabix Slices



A sweet treat for after dinner or on-the-go snacking.

Ingredients:

🕢 100g Weetabix

🕢 140g chopped dates

1/2 cup sunflower seeds

2 tablespoon desiccated coconut

11/2 tablespoon honey

1 orange peel grated

Juice of 1 orange

60g cocoa powder

30g dark chocolate (for melting)

Method:

- Place ingredients in a food processor or blender.
- Blitz until the mixture comes together into a ball, may take 3-5 minutes. Add in water if needed to bind mixture.
- Line a loaf tin with baking paper.
- Press mixture into the loaf tin using the back of a spoon.
- Melt dark chocolate in the microwave and pour over top of the mixture in the loaf tin.
- Refrigerate for 2 hours, slice and enjoy!

Top Tip: Store in airtight container in fridge and eat within a week.

Typical values per slice:

Energy	Carbohydrate	Protein	Fat	Iron
174kcal	22g	4.6g	6.6g	2.7mg

Allergens: wheat, barley, sulphites.

30

Iron Bites

A simple and quick to make snack, perfect for on-the-go & busy days.

Ingredients:

1½ tablespoon golden syrup

- 150g dates, pitted
- 50g dried apricots
- 🕢 3 tablespoon milled flaxseed
- 🕢 3 tablespoon pumpkin seeds

30g cashew nuts
25g almonds
80g oats

2 tablespoon desiccated coconut

Method:

- Add golden syrup, dates and dried apricots to a food processor.
- Blend on highest setting for 1-2 minutes.
- Add in the rest of the ingredients, except some coconut for garnish.
- Pulse on medium 15-20 times to combine mixture.
- Use your hands to roll golf ball sized pieces of the mixture.
- Roll bites in light coating of coconut for garnish.
- Enjoy immediately or store in airtight container in fridge and eat within a week.

Top Tip: Bites can be frozen for up to one month.

Typical values per bite:

Energy	Carbohydrate	Protein	Fat	Iron
155kcal	19g	3.5g	6.5g	1.4mg

Allergens: oats, almonds, cashews, sulphites.

About the Authors

Mairead Kennedy, MSc



Mairead graduated from University College Cork with a MSc in Human Nutrition and Dietetics in 2023. Mairead worked on the development of this resource as part of her research project during her masters. Since then, she has worked as a staff grade dietitian in Cork University Hospital, where her specialities of interest include women's health and oncology. She is a CORU

Registered Dietitian, who is passionate about providing evidence-based nutritional support to those vulnerable to malnutrition.

Elaine McCarthy, PhD



Elaine graduated from University College Cork with a BSc in Nutritional Sciences in 2012 and PhD in Human Nutrition in 2016. Elaine is now a Lecturer in Nutrition at the School of Food and Nutritional Sciences in University College Cork as well as a Principal Investigator at the Cork Centre for Vitamin D and Nutrition Research and Lead Investigator at

the INFANT Research Centre. Her main research interests are in the field of maternal and paediatric nutrition, particularly on the role of iron in growth and development during pregnancy and early life.

Acknowledgements

Thank you to Jette Virdi for her wonderful styling and photography of the recipes included in this guide. Huge thanks also to Jonathan Leahy Maharaj, Creative Lead and Graphic Designer at UCC Academy DAC for all of his work in bringing this guide to life. Their creative expertise has combined to provide us with a truly engaging and beautiful piece of work.

This project would not have been possible without the support and guidance of Alana Dineen, Senior Clinical Pharmacist – Obstetrics and Gynaecology and Dr Karen McNamara, Consultant Obstetrics and Gynaecology at Cork University Maternity Hospital.

Thanks also to the Ireland South Women and Infants Directorate working group for the Clinical Guideline on the Management of Iron Deficiency and Iron Deficiency Anaemia in Pregnancy and the Postpartum Period.

A final word of thanks to the following registered dietitians for their help and support with this project: Linda Culliney, Louise O'Mahony, Michelle Kealy, Ciara Ronayne, Nicola Byrne, Bridie Kennelly, Michelle Fitzpatrick, Aisling Kenny and Dr Samantha Cushen.







0 irelandsouthwid.cumh.hse.ie 🕅 @irelandsouthwid

() @irelandsouthwomenandinfants





ainfantcentre

() @infantcentre



School of Food and **Nutritional Sciences**



ucc.ie/en/fns

🕅 @fnsucc



() @uccfoodnutrition